AMERICAN MACHINIST

September 20, 1939

MACHINE TOOL
Show-in-Print Number

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VOLUME 83 — NUMBER 19

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A McGRAW-HILL PUBLICATION

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★

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★

DEPARTMENTS

What's in This Issue 71

"The Show in Print"

THE REASONS FOR POSTPONEMENT of the Machine Tool Show of 1939 are given in full on page 703. Suffice it to say here that, from the moment war broke out in Europe, the machine tool industry, already overtaxed, had to appropriate every hour of its entire personnel to the tremendous task immediately before it.

In this "Show in Print" Number, however, you will get a presentation and a record of much of the new equipment which would have been on display at the Show. Editorial pages and advertising pages alike bring you the stories of dozens of production-increasing, cost-reducing tools.

You, too, are probably facing the busiest period in your business life. For the United States must now become the world's workshop. Perhaps your plant must redouble its output of your present products. Perhaps you must plan to shift your production to some products other than those you now make, things in which there would otherwise be a dire shortage.

In either case, this "Show in Print" will be invaluable in these months to come. Study it, both editorial and advertising pages, with the purpose of selecting modern tools to meet your immediate needs. Preserve it for reference in the months to come.

★ Much of the material in this issue was already in production when the sudden emergency forced the postponement of the Show. So we must ask our readers to pardon any references to exhibits which may appear in either editorial or advertising pages. Such references may even serve the good purpose of bringing to you in this number, still more realistically, the Machine Tool Show in Print.

Cut all 3 ON THE No. 16 HYPOID GENERATOR

SPIRAL BEVEL GEARS
smoothness, quietness and strength under all operating conditions

***ZEROL BEVEL GEARS**
controlled, localized tooth contact of spiral bevels with thrust characteristics of straight bevels

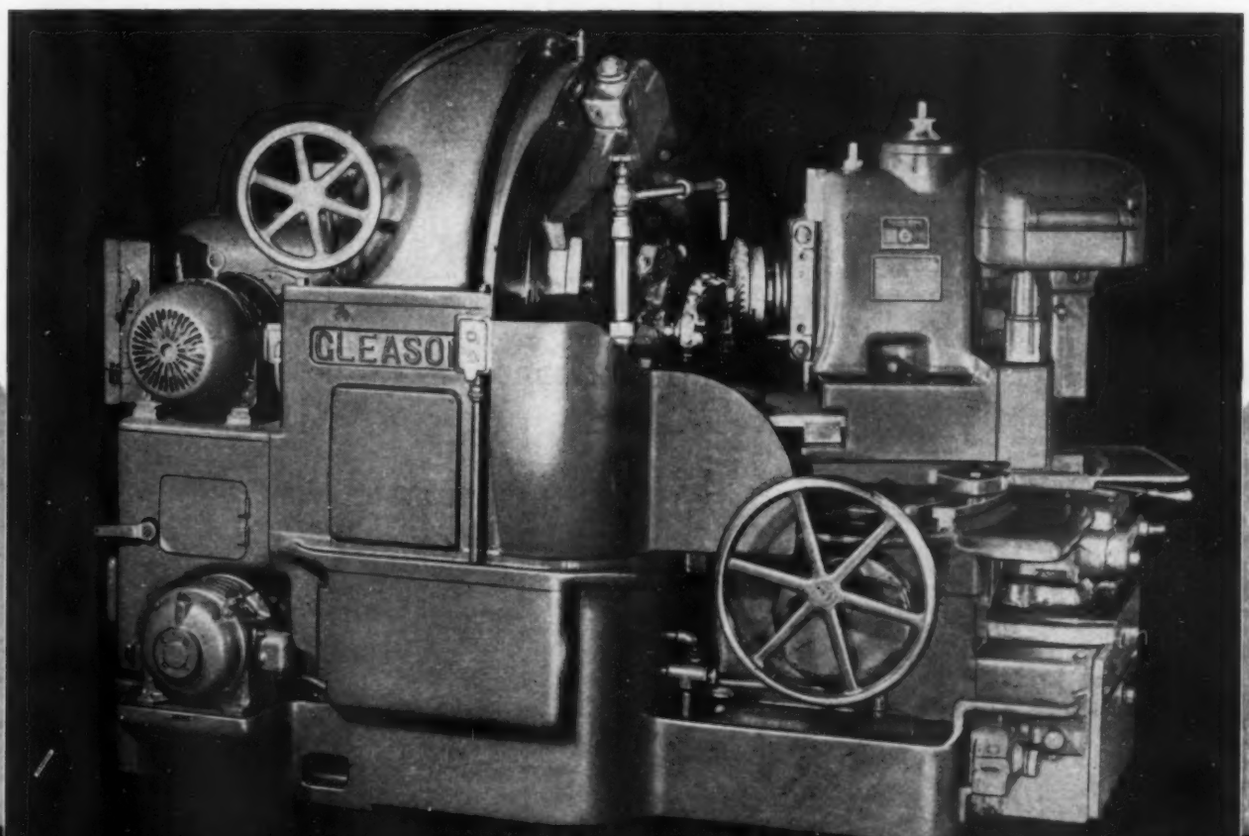
HYPOID GEARS
smoother and stronger than spiral bevels plus pinion-shaft offset

SPIRAL bevel, Zerol bevel and hypoid gears —you can cut all three on the Gleason No. 16.

The No. 16 combines the speed and quality of a production machine with the wide range of pitch and gear diameter required for jobbing. Tooling cost is low on the No. 16—only a few cutters are required for the entire range of spiral bevel and Zerol gears.

A suggestion—replace your straight bevel gears with Zerols or spiral bevels and cut all bevel gears on the No. 16. Write for detailed information.

*Reg. U. S. Pat. Off. Pat. Pending. A curved-tooth bevel gear with zero-degree spiral angle. Zerols are replacing straight bevel gears where thrust limitations prevent the use of spiral bevels. Zerols can be substituted for straight bevels without change in mountings. Like spiral bevels, the localized tooth contact of Zerols allows for slight displacements without concentrating the load dangerously near the ends of the teeth.



No. 16 HYPOID GENERATOR

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy Years

VISIT *The* Lodge & Shipley display of modern Lathes

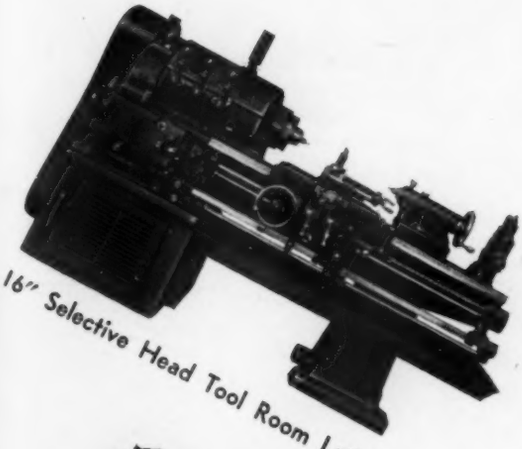
Lathe development entirely in accord with American traditions of resourcefulness and invention has been Lodge & Shipley's objective for the past 47 years so that today a definite picture is presented—extremely low tolerances—dependable accuracy—ease of operation and lower cost production. The Lodge & Shipley lathe is truly a concrete example of mechanical progress designed to meet Tomorrow's needs with Today's equipment. The postponement of the Machine Tool Show need not interrupt your plans to witness the performance of the machines illustrated on the opposite page. Lodge & Shipley extends to you a personal invitation to visit them at their plant where these machines are on display and in operation the year around.

THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO

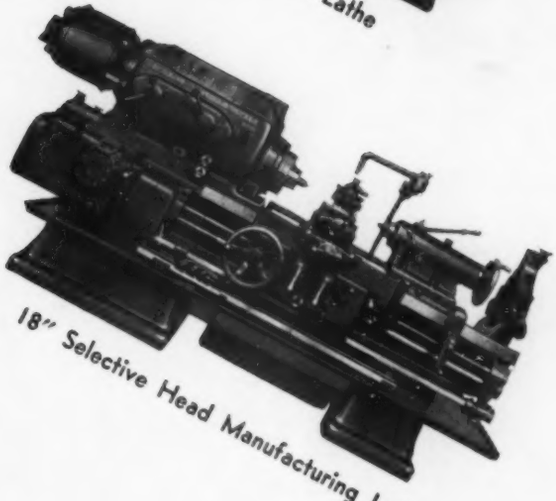
ON DISPLAY AND IN OPERATION

"....at the Lodge & Shipley Plant"

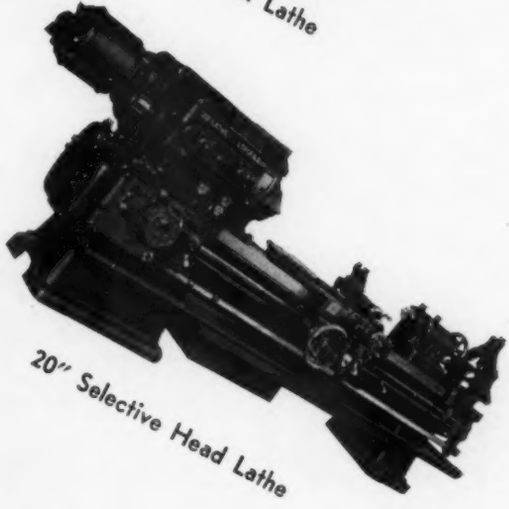
12" Selective Head Lathe



16" Selective Head Tool Room Lathe

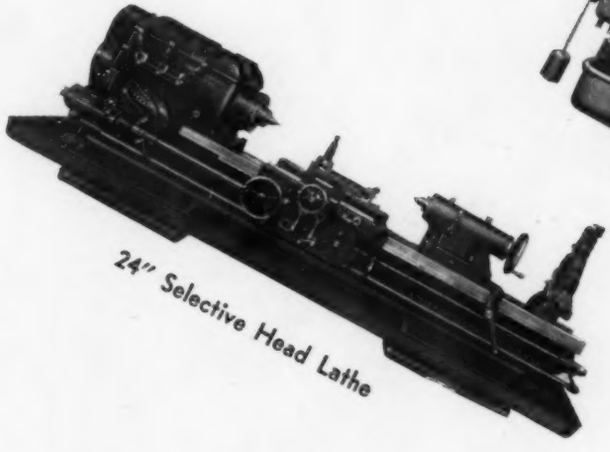


18" Selective Head Manufacturing Lathe



20" Selective Head Lathe

No. 3 Duomatic Lathe



24" Selective Head Lathe

WHO SAYS YOU CAN'T DO SMALL LOT

Machine—CINCINNATI No. 2 Centerless Grinder.
Part—Passenger stem pinion.
Material—Steel forging.
Operation—Finish grind 1.8276 diameter.
Stock Removal—.0002″ to .0005″.
Limits—Size, .0001″; straight, .0000″; roundness, .00005″.
Method—Infeed.
Finish—Good commercial.

CINCINNATI

A SYMBOL OF A DEFINITE STANDARD OF WORTH

SAVE WITH A CINCINNATI

LOTS PROFITABLY ON THE CENTERLESS?

Here's Proof That Lots of 12 to 600 Pieces Can Be Handled on the Centerless at a Saving!

CINCINNATI'S Centerless method of grinding in straight line production is widely accepted.

Not so well known is the adaptability of the Centerless to small lots. For proof, let's look at the case of an Ohio manufacturer of lathes.

He grinds *over 200 different parts* on the Centerless. The average lot quantity is 86 pieces, the minimum 12 and the maximum 600.

A bushing, ground on two diameters, is run in lots of 18. With the previous method, set-up time was 14 minutes, grinding time 7.2 minutes per piece. On the Centerless, although set-up time was increased, grinding time was reduced to 1.88 minutes per piece. Time saving on the lot was 48 minutes.

On cast-iron cross-feed screw bushings, run in lots of 12, the Centerless reduced time from 3.61 minutes per piece to 1.1 minutes.

Grinding 600 bushings, time was cut from 5.26 minutes to 0.7 minute for a total saving per lot of 45 hours, 36 minutes.

If you'll write for "Handling Small Lots on a Centerless Grinding Machine", you'll have further information on the use of the Centerless for small lots. In addition, descriptive bulletin G-424 is available on your request.

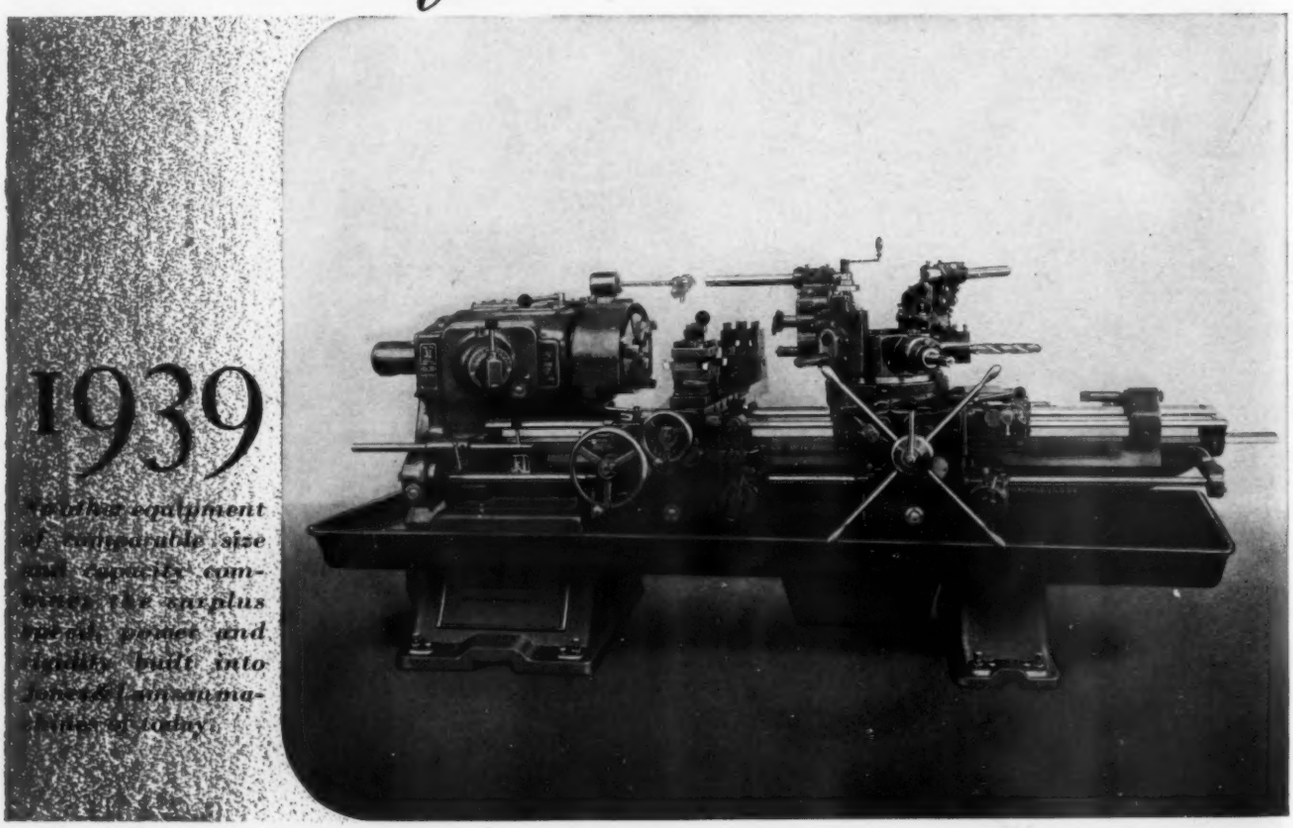
CINCINNATI Centerless Grinding Machines are built in Nos. 2, 3, 4, 5, 6 sizes.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED

Manufacturers of

TOOL ROOM AND MANUFACTURING MILLING MACHINES
SURFACE BROACHING MACHINES
CUTTER SHARPENING MACHINES
CENTERTYPE GRINDING MACHINES
CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES

First yesterday — and first today, Jones & Lamson builds for tomorrow!

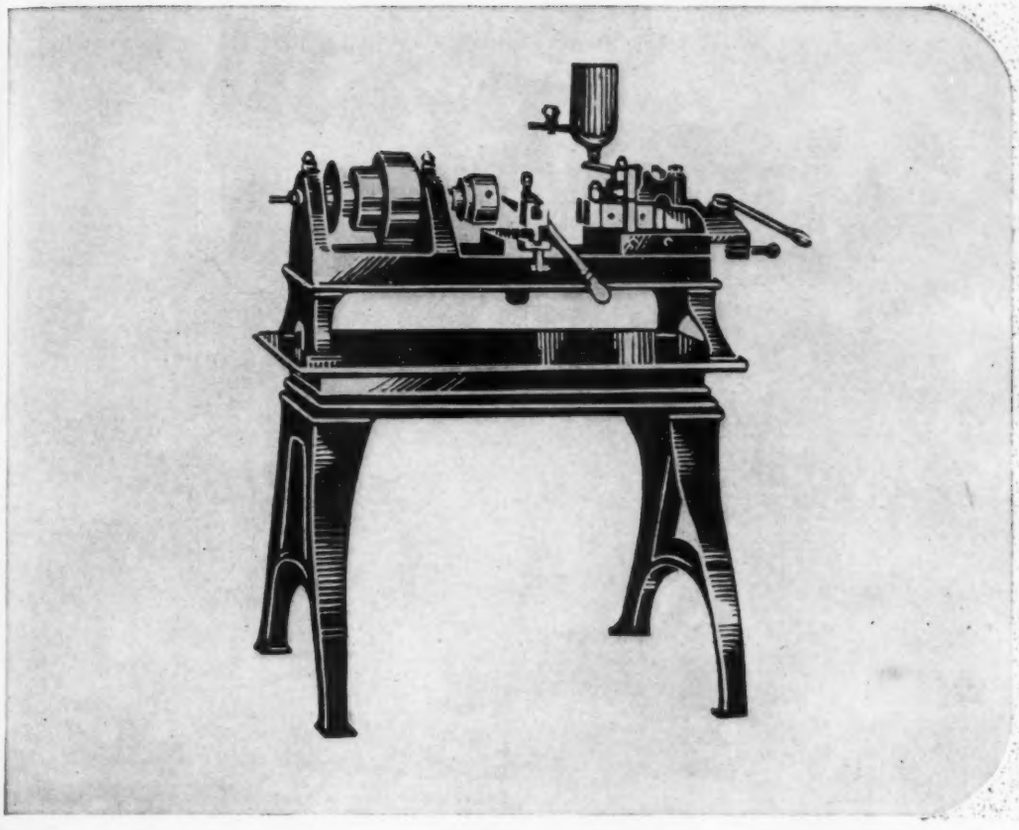


1939

Machine equipment of commercial size and capacity combines the surplus speed, power and rigidity built into Jones & Lamson machines of today.

JONES & LAMSON

SPRINGFIELD, VERMONT, U. S. A.



1855

So far as known, this machine carried the world's first indexing turret

The record of more than a hundred years has accustomed men to look to Jones & Lamson today for machines to handle the tools of tomorrow . . .

For more than a hundred years, Jones & Lamson Machine Company, and its direct antecedents, have originated and developed an unbroken succession of major improvements in machine tool design and equipment. Today this organization continues to concentrate all its experience, resources and ingenuity on helping the metal working industry to earn new profits. To this end, modern Jones & Lamson machines embody more speed, power and rigidity than are combined in any other equipment of comparable size and capacity. Today you can protect, not only your present earnings, but your future profits by purchasing Jones & Lamson equipment to handle the tools of tomorrow.

J&L

MACHINE COMPANY

Manufacturers of **TURRET LATHES, FAY AUTOMATIC LATHES, AUTOMATIC THREAD GRINDING MACHINES, COMPARATORS, DIE HEADS AND DIE CHASERS.**

Involute Profile Measurement

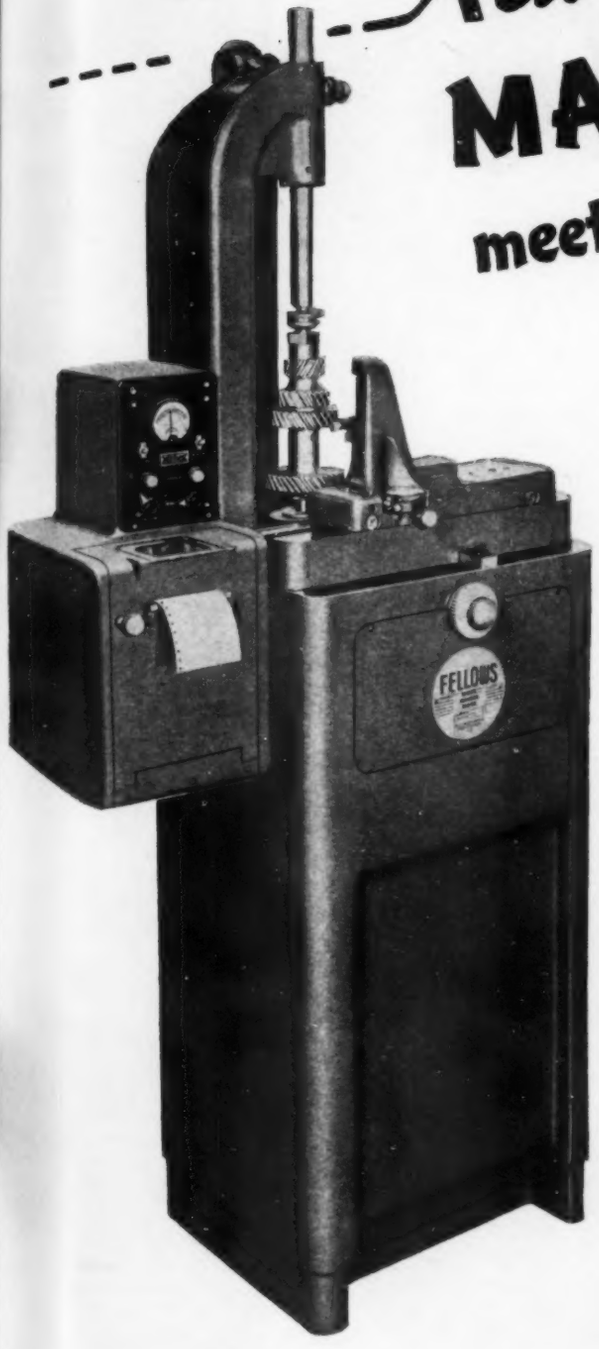
Essential in Production of *Accurate Gears*

Write for a copy of "Fellows Involute Measuring Machines"—a new booklet just off the press.

THE FELLOWS GEAR

78 River Street

New FELLOWS MACHINES meet Every Requirement!



No base rolls to change! These new machines (6 and 12 in. P.D. sizes) operate on an entirely new principle. No extra parts are needed to check any gear within the range of the machine. A master involute cam is employed and, by setting the position of the main slide with standard size blocks, the pointer which measures the involute profile is automatically located at the correct base circle radius.

These machines are available with an electrical recording unit which can be employed for making a permanent record if visual indicator reading is insufficient.

FELLOWS
Complete Line for Precision Gear Manufacturing

GEAR SHAPERS
RACK SHAPERS
HOURGLASS GEAR SHAPERS
COMPLETE LINE OF CUTTERS
THREAD GENERATORS
MASTER GEARS
LAPPING MACHINES AND LAPS
HELICAL CUTTER SHARPENERS
BURNISHING MACHINES
TESTING EQUIPMENT

SHAPER COMPANY

Springfield, Vermont or 814 Fisher Bldg., Detroit, Mich.

FREE... *16* MILLING *a day*

THAT'S exactly what this Diesel engine manufacturer is getting since he installed two CINCINNATI 5-60 Duplex Hydromatic Milling Machines. Formerly, it took 83 minutes to rough and finish both sides of the crank pin end and the wrist pin ends on connecting rods, which are 3' 2" long. Then a Duplex Hydromatic was installed.

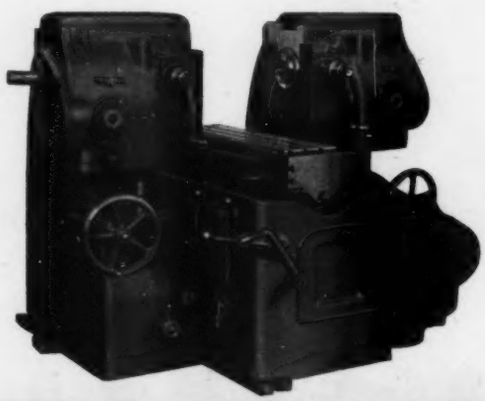
Now, the job is done in **21 minutes,** including loading and unloading. Formerly, six pieces were finished per 8-hour day; now 22 are obtained—or 16 **extra** milling operations a day. In 11 months' time, the actual cash saving on this and the other machine amounted to $3000.

May we send you Catalog M-655, which fully describes many different jobs milled on CINCINNATI Hydromatics, and the savings obtained on each?

* * * * *

Part—main connecting rod.
Material—drop forging.
Stock Removal—rough, ¼"; fin., .020".
Limits—+ .000" — .002".

Cutter R.P.M.—31.
Table Feed—3" rough, 2" finish.
Time—21 minutes, floor to floor.
Size of part—3' 2" long.



CINCINNATI Hydromatic Milling Machine. Plain and Duplex Styles. Each style available in 18, or more, different sizes. The CINCINNATI standard plan of unit construction makes possible a variety of other spindle constructions, as further expressed in the catalog.

CINCINNATI

A SYMBOL OF A DEFINITE STANDARD OF WORTH

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED

Manufacturers of

Tool Room and Manufacturing Milling Machines
Surface Broaching Machines Centertype Grinding Machines Cutter Sharpening Machines
Centerless Grinding Machines Centerless Lapping Machines

OPERATIONS

SAVE WITH A *New* CINCINNATI

FOR THE ULTIMATE IN MODERNIZATION

LANDIS

12,000 Bolts per Grind

especially when the bolts are hot forged and made from .15 to .20 carbon steel. A mid-western manufacturer obtains just such production from its

LANDIS AUTOMATIC FORMING AND THREADING MACHINE

The company referred to manufactures pole line equipment. The Landis Automatic Forming and Threading Machine in this plant is used to thread 7/8" diameter hot forged machine bolts. The length of the thread is 2" and the thread must be held to class No. 2 specifications.

The Landis Automatic, operating at a cutting speed of 50 feet per minute, points and threads 570 of these bolts per hour. The average production, per grind of the chasers, is more than 12,000 bolts.

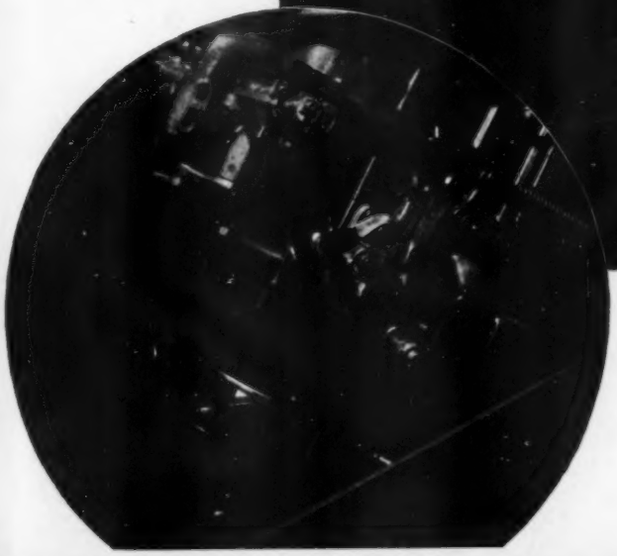
Such performance assures low tool cost and guarantees the ability of the Landis Automatic Forming and Threading Machine to meet modern Production requirements.

Investigate the possibilities of using the Landis Automatic Forming and Threading Machine for your production Threading Operations.

LANDIS MACHINE C
WAYNESBORO, P

your THREADS

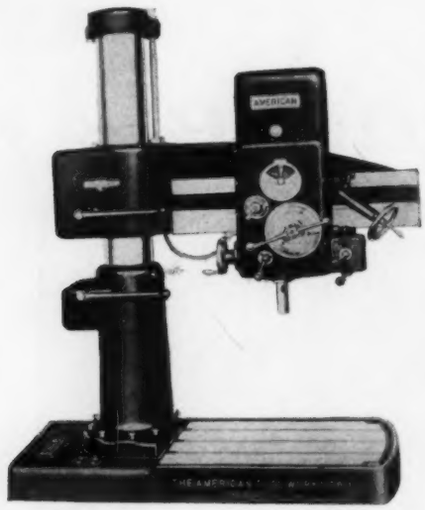
is Real Performance « «



The 1" Landis Automatic Forming and Threading Machine in this mid-western plant, with a close-up showing a 7/8" hot forged machine bolt about to be ejected from the grips.

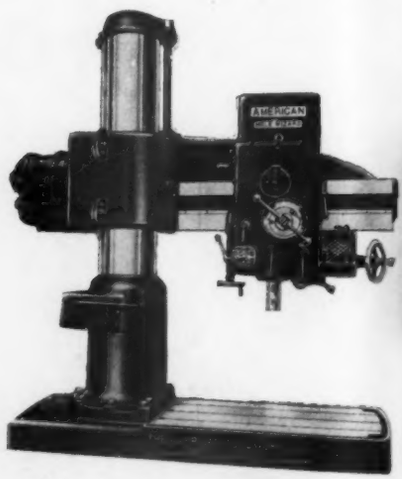
E COMPANY, Incorporated
P E N N A., U. S. A.

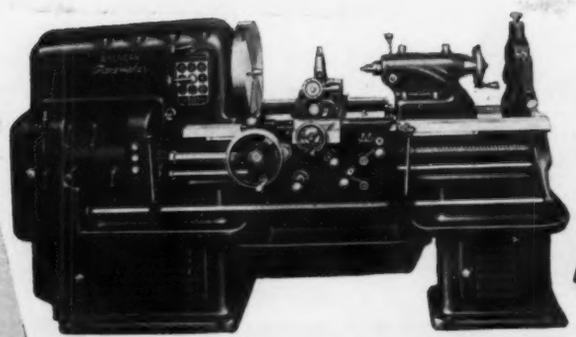
The



"AMERICAN" HOLE WIZARDS
9 SPEED AND 12 SPEED
For Greater Profit

AMERICAN 32 SPEED HOLE
WIZARDS
For Greater Profit





"AMERICAN"
PACEMAKER LATHES
For Greater Profit

ASK FOR DETAILS—WE'LL

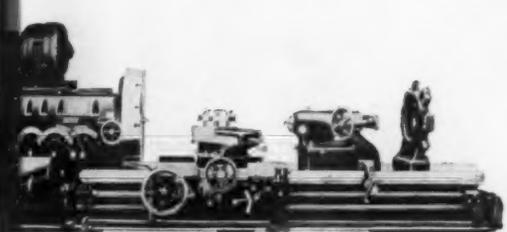
The AMERICAN TOOL

LATEST "AMERICAN"

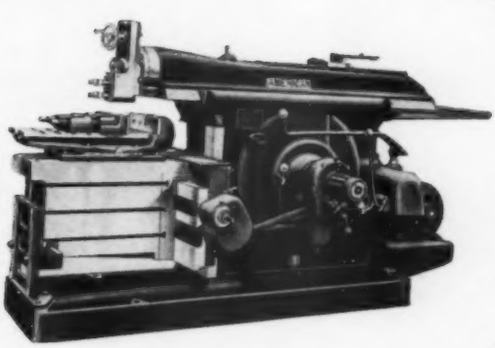
LATHES • RADIALS • SHAPERS

Spotlighted

FOR YOUR PROFITS



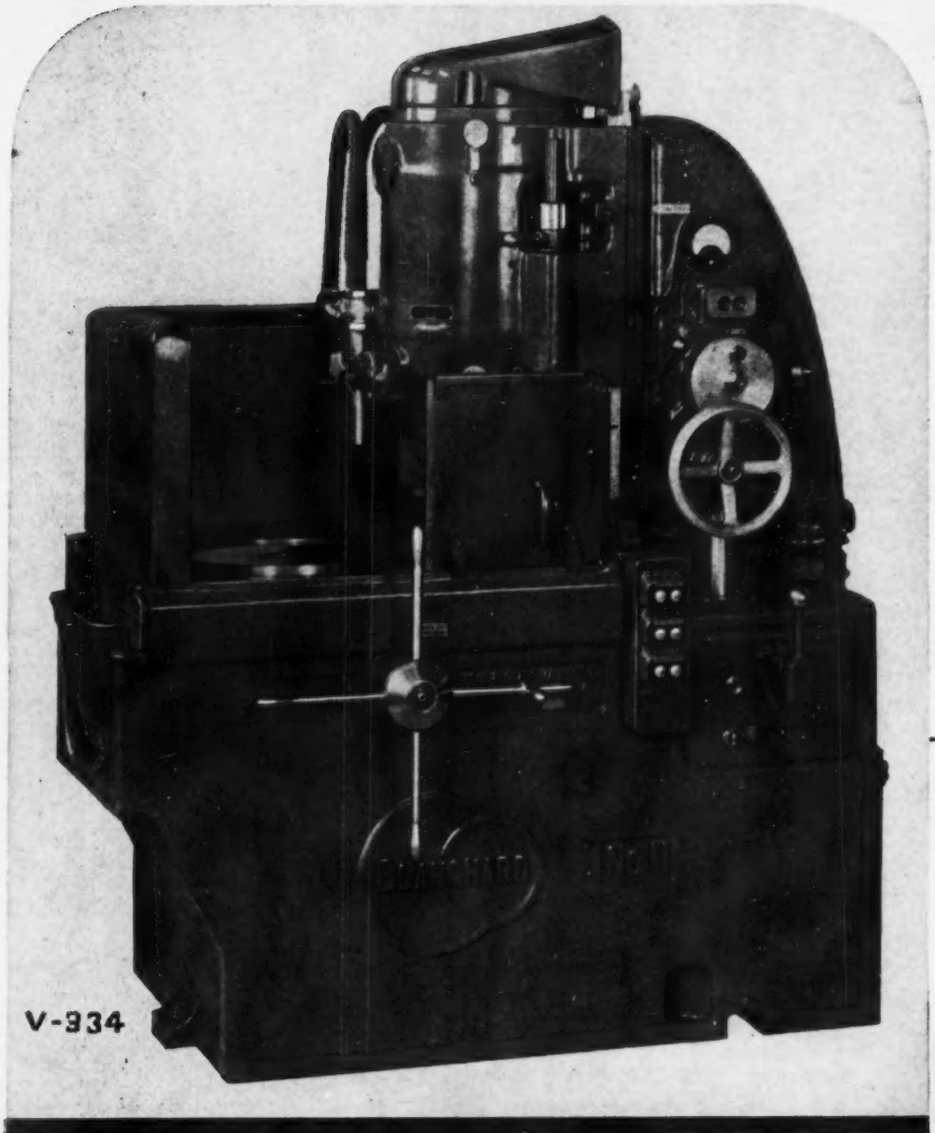
"AMERICAN" SUPER-PRODUCTIVE LATHES
For Greater Profit



"AMERICAN" AUTO-OILED SHAPERS
For Greater Profit

BE GLAD TO SUPPLY THEM

WORKS CO. CINCINNATI, OHIO



New #11 BLANCHARD GRINDER

This new small Blanchard has the power, the rigidity, and the ease of control that have made the No. 18 Blanchard so successful. Smaller in overall size than the No. 10 Blanchard which it supersedes, it not only has 50% more power on its spindle but has larger work capacity, 20 inches diameter by 8 inches high under new wheel. Fast, accurate, easy to operate, it is bound to be popular for tool work or small lot production.

Study the details in the No. 11 Blanchard Catalog. Write for your copy today!

BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE, MASS., U. S. A.

CONTROLLED PRECISION from FORGED rings to finished bearing

Forged for exact *control* of shape and grain flow; for maximum strength and resistance to wear — manufactured with completely *controlled* precision at every step, New Departure Ball Bearings are used by builders everywhere, to make fine machine accuracy permanent. . . . .
New Departure, Division of General Motors, Bristol, Connecticut.

NEW DEPARTURE

THE FORGED PRECISION BEARING

FIRST LINE *of* DEFENSE

Right now when American industry stands at the threshold of a great new cycle of activity . . . when the forces of productiveness and profit make essential higher levels of efficiency; LeBlond presents new tools to serve American industries' demands. Each new LeBlond machine possesses those basic LeBlond fundamentals of accuracy, precision and work versatility to even greater degree. Operating controls are simplified.

And this we make clear: The new LeBlond line is ready to serve American industry first. America first—has been and will continue to be LeBlond's first and foremost area of service.

LeBLOND
CINCINNATI, OHIO
U.S.A.

"First Line of Defense" brings you First news of these new and greater LeBlond tools—news that should be in your hands as an American plant executive preparing for more profitable production.

Write today for your copy, via the coupon.

THE R. K. LeBLOND MACHINE TOOL CO.
CINCINNATI, OHIO

SEND NOW FOR YOUR "FIRST LINE OF DEFENSE"

THE R. K. LeBLOND MACHINE TOOL CO.
Dept. H-27 Cincinnati, Ohio

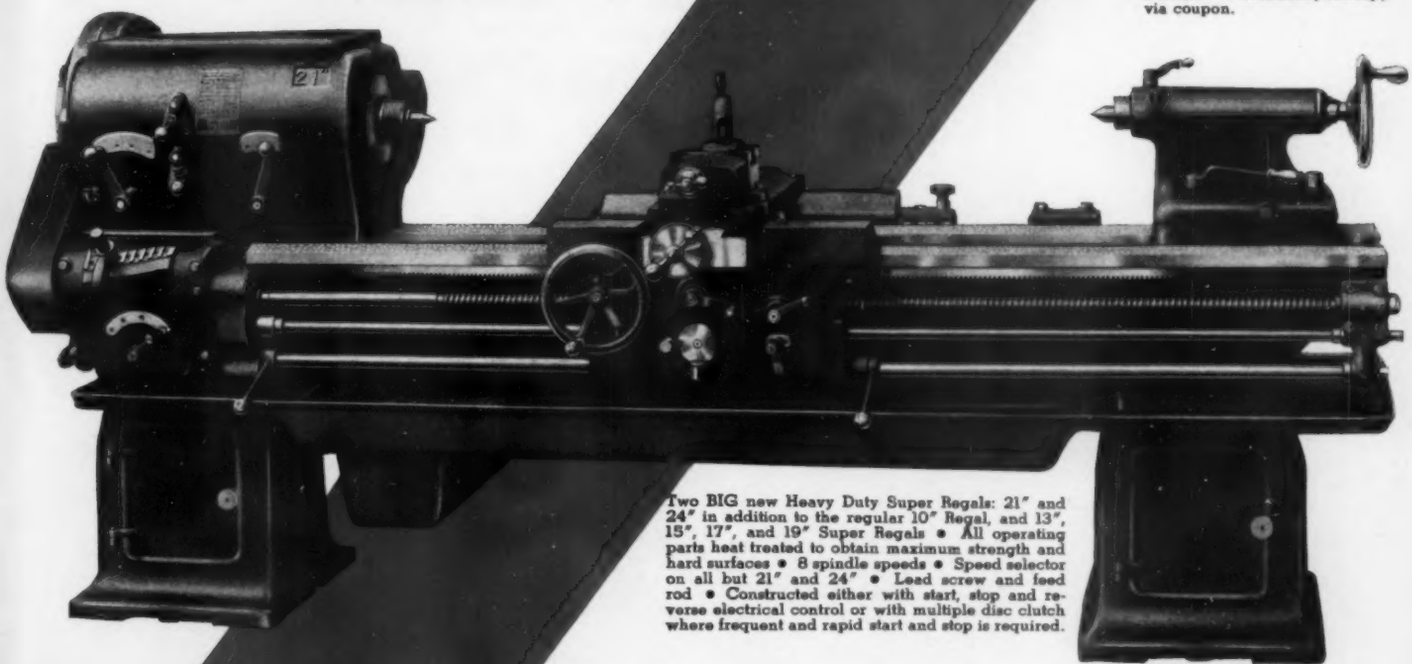
Send me at once the LeBLOND Show In Print—"FIRST LINE OF DEFENSE."

Name _____ Address _____

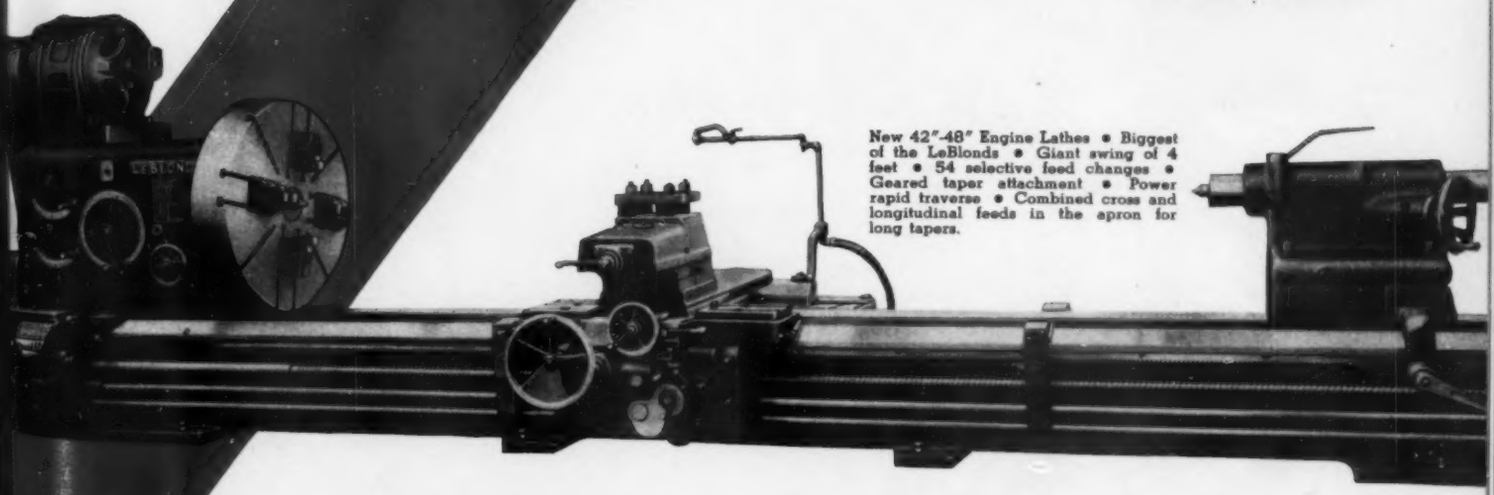
City _____ State _____

New No. 3 Cutter Grinder • New Universal wheel head with 3 independent and co-ordinated planes of full circle movement • Angular settings with unparalleled range.

New LeBlond Tool Room Lathe • Sensationally advanced design • Wider versatility • Detailed in booklet "First Line of Defense" • Write for your copy via coupon.



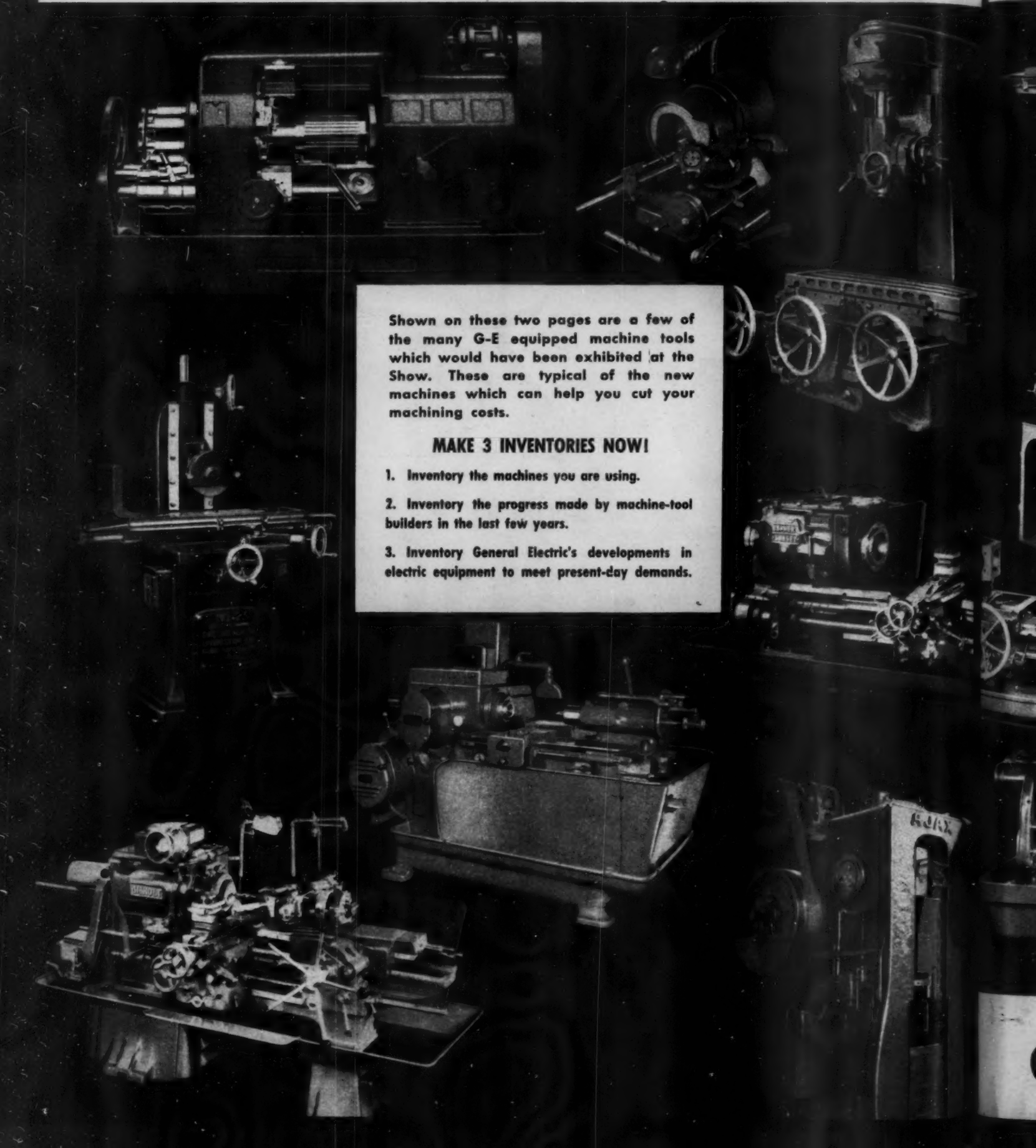
Two BIG new Heavy Duty Super Regals: 21" and 24" in addition to the regular 10" Regal, and 13", 15", 17", and 19" Super Regals • All operating parts heat treated to obtain maximum strength and hard surfaces • 8 spindle speeds • Speed selector on all but 21" and 24" • Lead screw and feed rod • Constructed either with start, stop and reverse electrical control or with multiple disc clutch where frequent and rapid start and stop is required.



New 42"-48" Engine Lathes • Biggest of the LeBlonds • Giant swing of 4 feet • 54 selective feed changes • Geared taper attachment • Power rapid traverse • Combined cross and longitudinal feeds in the apron for long tapers.

WHAT'S NEW IN ELECTRIC E

A Few of the G- Equ



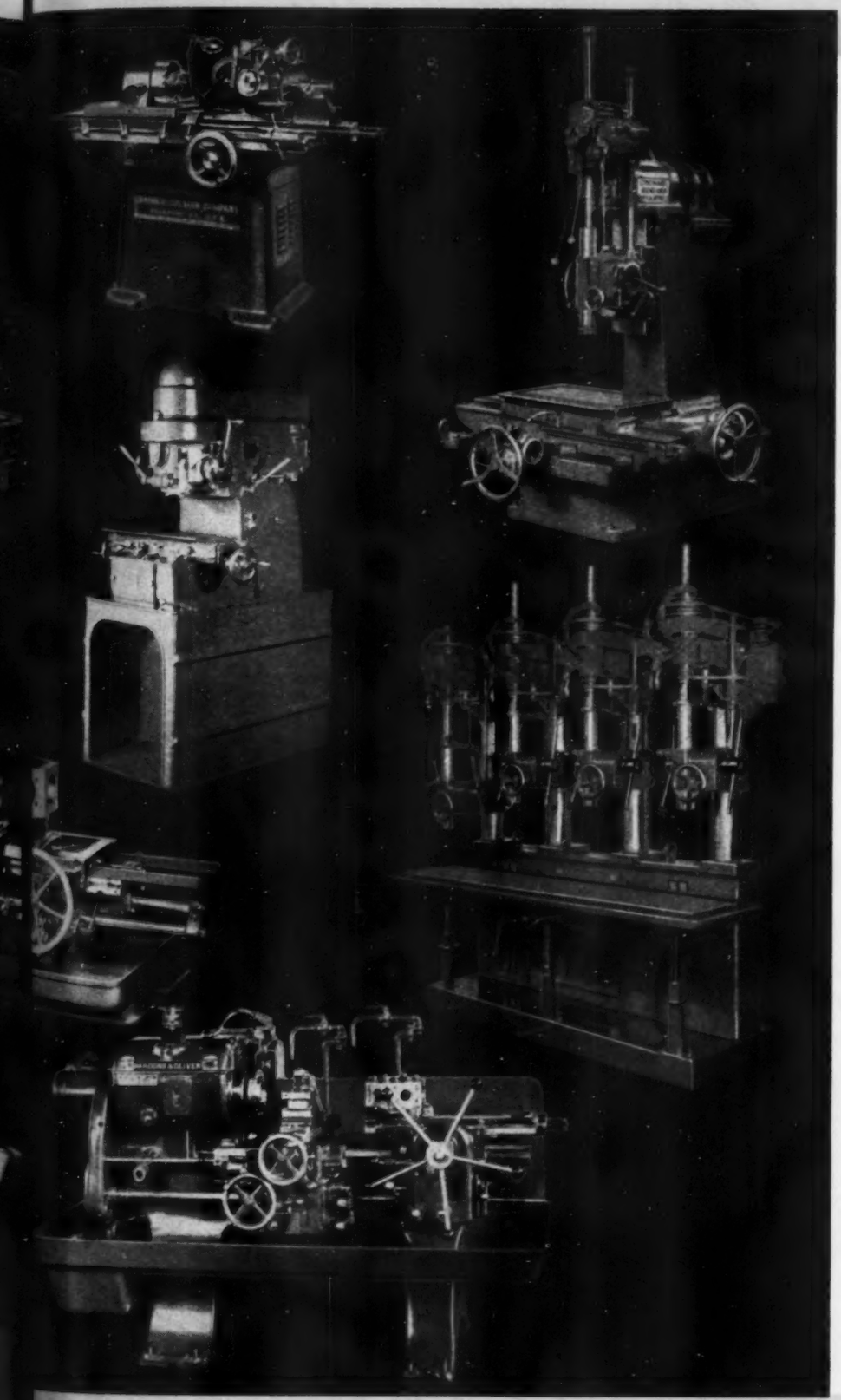
Shown on these two pages are a few of the many G-E equipped machine tools which would have been exhibited at the Show. These are typical of the new machines which can help you cut your machining costs.

MAKE 3 INVENTORIES NOW!

1. Inventory the machines you are using.
2. Inventory the progress made by machine-tool builders in the last few years.
3. Inventory General Electric's developments in electric equipment to meet present-day demands.

EQUIPMENT FOR MACHINE TOOLS

Equipped Machines That Were to Have Been Shown in Cleveland



SOME OF THE MANUFACTURERS WHO WOULD HAVE EXHIBITED G-E EQUIPPED MACHINES

	Booth No.
Abrasive Machine Tool Co.	1109
The Ajax Mfg. Co.	4102
The American Tool Works Co.	5619
The Arter Grinding Machine Co.	5116
Baker Bros., Inc.	1111
Barber-Coleman Co.	5601
Bardous & Oliver	5103
Barnes Drill Co.	2302
The Blanchard Machine Co.	5710
Brown & Sharpe Mfg. Co.	5310
Bryant Chucking Grinder Co.	3101
Buffalo Forge Co.	5105
The Bullard Co.	5702
The Carlton Machine Tool Co.	2202
The Cincinnati Bickford Tool Co.	5610
The Cincinnati Milling Machine Co. and Cincinnati Grinders, Inc.	5604
The Cincinnati Shaper Co.	5708
The Cleveland Automatic Machine Co.	4103
Consolidated Machine Tool Corp.	4101
Davenport Machine Tool Corp.	5706
The Eastern Machine Screw Corp.	5007
Ex-Cello Corporation	1102
The Fellows Gear Shaper Co.	5115
The Foote-Burt Co.	5304
The Fosdick Machine Tool Co.	3105
Gallmeyer & Livingston Co.	5107
Giddings & Lewis Machine Tool Co.	5703
Gisholt Machine Co.	1204
Gleason Works	5110
The Goss & de Leeuw Machine Co.	5214
The G. A. Gray Co.	5614
Greenlee Bros. & Co.	5118
Hanchett Mfg. Co.	1201
The Hanson-Whitney Machine Co.	1208
The Heald Machine Co.	5606
The Hendey Machine Co.	5602A
The Ingersoll Milling Machine Co	5602
Jones & Lamson Co.	5308
Kearney & Trecker Corp.	1104
Landis Tool Co.	5302
The R. K. Le Blond Machine Tool Co.	2102
Leland Gifford Co.	2204
The Lodge & Shipley Machine Tool Co.	5801
The Lucas Machine Tool Co.	5611
The Lapointe Machine Tool Co.	5701
Mattison Machine Works	5607
Moline Tool Co.	3302
The Monarch Machine Tool Co.	1103
The National Acme Co.	3106
The New Britain Machine Co.	5202
Norton Co.	5101
Potter & Johnston Machine Co.	5613
Pratt & Whitney, Div. Niles-Bement-Pond	5608
Reed-Prentice Corp.	2304
Rivett Lathe & Grinder, Inc.	1202
Rockford Machine Tool Co.	5206
William Sellers & Co.	5704
Sundstrand Machine Tool Co.	5104
Van Norman Machine Tool Co.	5402
O. S. Walker Co., Inc.	3202
The Warner & Swasey Co.	5102

GENERAL ELECTRIC

011-551

THE MONARCH MACHINE TOOL CO. — SIDNEY, OHIO . . . U. S. A.

Here's What You'll See in the Monarch Booth

After registration, walk into the main auditorium. The Monarch exhibit is the first large space on the left as you enter the great arena. Here you will see 14 Monarch lathes of various sizes and types...the result of long-continued research and unending development to make them produce more and better work...in shorter time, and with less operator effort and fatigue. You will see how Monarch tool maker's lathes and engine lathes, with various attachments, have broadened the scope of profit possibilities to an extent never previously approached through the use of the lathe.

Eight of Monarch's Cleveland Show Machines, representing the latest developments in Lathes, are now on display in our new showroom at Sidney, Ohio, where visitors are always welcome.

FOR THE FIRST TIME . . .

A new tool maker's lathe will be shown. It is streamlined and equipped with finger-tip controls—it is fitted with a new device for chasing threads to almost unbelievable lead accuracies.

RECENTLY INTRODUCED . . .

Two of the new 10" x 20" sensitive precision tool maker's lathes, which were recently introduced, will be shown. These lathes operate at speeds as high as 5000 R. P. M. Almost any speed is instantly available. So many people will want to see these lathes, that two of them have been placed on exhibit at the show.

FOR THE FIRST TIME . . .

The new Monarch-Keller-Kelly-shaping lathe will be shown for the first time. It will be doing the work . . . making dies, moulds and shapes impossible to conceive being done on a lathe. You won't believe it unless you see it! Literally, it will reproduce almost any shape that a cutting tool can machine . . . and, in a fraction of the time required by any other known means. Two new streamlined lathes, each providing 100 to 1 range of spindle speeds, one powered hydraulically and the other electrically, each arranged to automatically maintain any desired surface cutting speed, will be in operation. One will be a tool maker's lathe and the other an engine lathe.

ANOTHER LATHE DEVELOPMENT . . .

Another lathe representing an outstanding Monarch development will be shown machining four different classes of materials, and automatically maintaining the correct or desired surface cutting speeds on all diameters. The profit possibilities in the use of these machines, on many classes of turning work, are literally breath taking. One large manufacturer, who is using two of these machines, states that they saved their original cost in the first four months' use. Another user reduced costs 75%.

RECENTLY AVAILABLE . . .

Then, you'll want to see Monarch's Automatic Sizing lathe in operation. The controls make the lathe an automatic machine so that one operator can attend two or more machines with no more effort than is required to handle one manually controlled lathe. These machines have been on the market for only the past few months. You cannot afford to miss seeing these machines in operation.

MAGNA-MATIC

The Monarch Magna-Matic automatic lathe will be shown on a variety of work. The fact that the "set-up" time on these machines is only 5 to 10 minutes or less will be demonstrated, as well as interesting evidence of their unusual metal-removing ability.

Last but not least, we will be Flame Hardening the way surfaces of lathe beds and other parts for our machines, just as we do on a production basis in our factory at Sidney. This revolutionary process of eliminating wear and preserving accuracy, the result of Monarch research, should prove of interest to every user of machine tools.

This is necessarily a brief description of the machines you will see in the Monarch booth. Each and every one of them was developed to meet requests by customers for machines that would help them make more things for more people at lower production costs. We suggest that you allow plenty of time for the Monarch Exhibit.

WITH MONARCHS!

To the man who has yet to buy his first PHILLIPS SCREW

IF YOU were the type of man who loves to putter around a home work shop, you would have been enthusiastic long ago about the Phillips Recessed Head Screw.

It really takes all the work out of screw-driving. The screw clings to the driver . . . you can start it with one hand, even without a pilot hole . . . it goes in straight . . . the driver can't slip out and gouge whatever you're fastening . . . and it turns as easy as a faucet.

Now suppose you take the time a man saves putting up a shelf in the pantry and multiply that by the number of screw-driving operations you have around your plant. When you realize that manufacturers in all branches of industry have cut assembly costs an average of 50% just by changing to Phillips Screws . . . you'll get an idea of what to expect in your own plant.

Add the stronger assemblies you get . . . the freedom from burrs and split heads . . . the improved appearance—and you've got something that you really ought to look into. There's money for you in that Phillips recess!

So here's what we suggest you do. Write today to one of the Phillips Screw manufacturers listed below . . . get all the facts or, better still, send a trial order . . . try driving them into a piece of wood—or watch one of your men use them on sheet metal or metal assemblies. We'll bet that when you visualize the savings that could be effected throughout your entire plant . . . you'll agree that *it costs less to use Phillips Screws.*

MACHINE SCREWS
SHEET METAL SCREWS
WOOD SCREWS
STOVE BOLTS

This Booklet will help your plant to cut fastening costs and improve assemblies.

Address one of the firms below for free copy.

PHILLIPS RECESSED HEAD SCREWS

U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,336. Other Domestic and Foreign Patents Allowed and Pending.

AMERICAN SCREW CO., *Licensor*
Providence, R. I.

CHANDLER PRODUCTS CO.
Euclid, Ohio

CONTINENTAL SCREW CO.
New Bedford, Mass.

CORBIN SCREW CORP.
New Britain, Conn.

THE LAMSON & SESSIONS CO.
Cleveland, Ohio

NATIONAL SCREW & MFG. CO.
Cleveland, Ohio

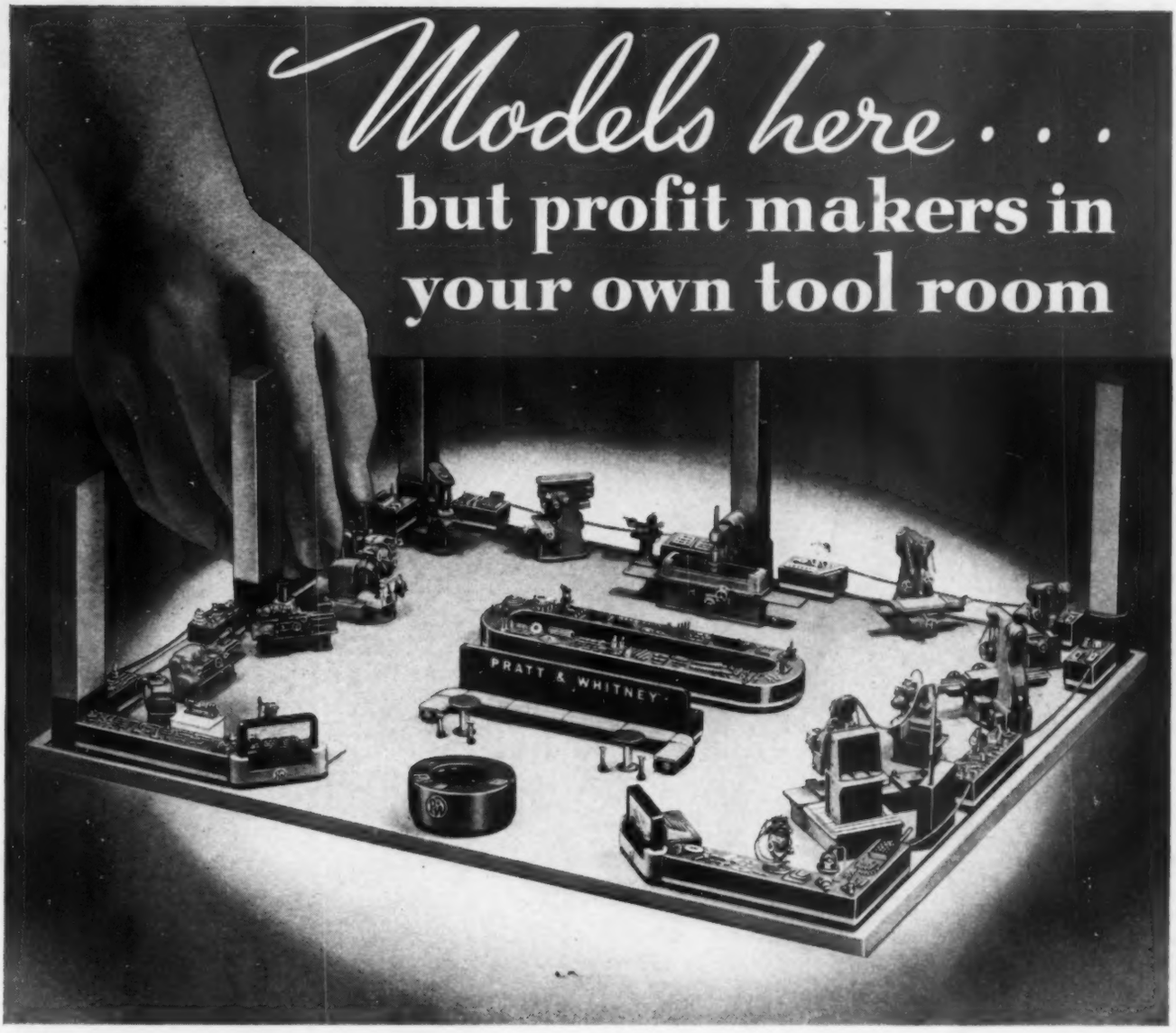
PARKER-KALON CORP.
New York, New York

PHEOLL MFG. CO.
Chicago, Illinois

RUSSELL, BURDSALL & WARD BOLT & NUT CO.
Port Chester, N. Y.

SCOVILL MFG. CO.
Waterbury, Conn.

IT COSTS LESS TO USE PHILLIPS SCREWS



HERE'S a scale model of the kind of precision equipment you'd like to have in your own plant. These are the *newest developments* in Lathes, Vertical Shapers, Jig Borers, Thread Millers, Surface Grinders, Die Sinkers, Gear Grinders, Keller Automatic Tool Room Machines, Flexible Shaft Machines, Small Tools and Gages. There is no better time than *now* for modernizing your tool room. Pratt & Whitney precision machines and tools have a way of smoothing out your shop troubles, and producing dividends. Remember—there is no better paying investment than Pratt & Whitney Precision Tool Room Equipment. Ask for complete information.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

HARTFORD . CONNECTICUT

"There goes a MIGHTY

he just gave me an idea

SMART Salesman . . .

that'll save us thousands of dollars"

"For years we have been using a complicated heat-treating practice on our motor parts. Today Jones walks in and shows me how, by using U·S·S Controlled Steels, we can simplify our heat treatment to get results as good or better—and with *no added cost of steel.* That's what I call smart steel selling."

AS a matter of fact, Jones is not a salesman. He couldn't take a steel order if you gave it to him. He's one of our metallurgical contact men.

The only thing he has to "sell" is information, and that costs you exactly nothing.

His job is to show steel users how to use steel more effectively—how to select steel on the basis of what it must do in service—and how to better fit steel to the fabricating equipment available.

Sometimes his recommendations to you actually mean smaller steel orders for us. But we believe they also mean increased customer goodwill — and more steel business in the long run.

Jones, and the men like him can give you thoroughly unbiased advice as regards steel, simply because they have the *entire range* of metallurgy's finest steels from which to choose. In working on your problems they can call upon the facilities of the most completely equipped research laboratories and the finest steel-making plants in America. The accumulated knowledge and experience of 81 years of steel making back them up.

If you want this kind of money-saving cooperation—if you value the practical assistance of expert steel technicians who are trained to look at steel problems through the eyes of the steel *user,* call us in.

USS *Controlled* STEELS

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Your Wisest Investment Today . . Better Machine Tools and Equipment

Catalog
141
lists the
Complete
Line

Brown & Sharpe Mfg. Co.,
Providence, R. I., U. S. A.

BROWN &

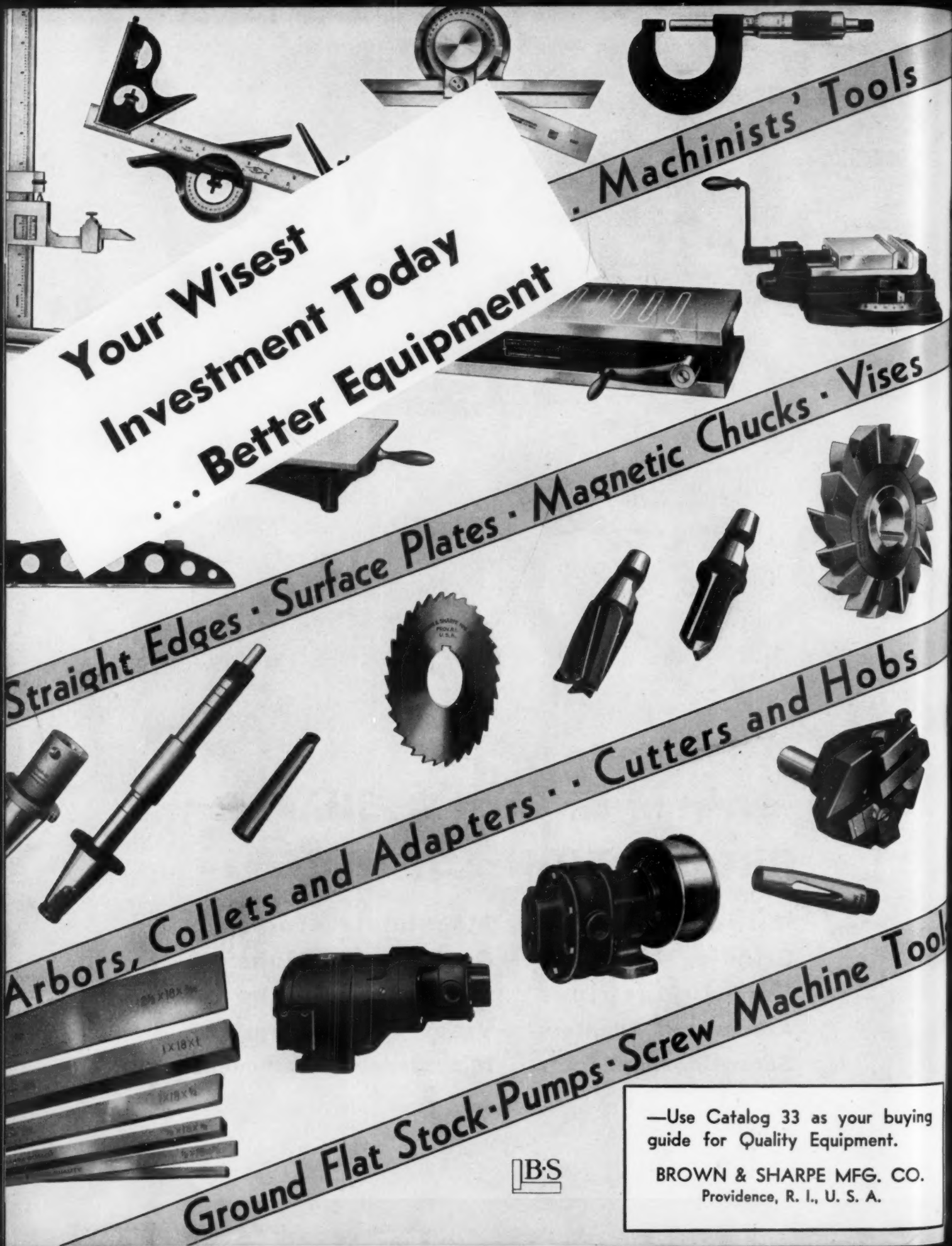
-The Way to PROFITS

Phillips Head Screws

. . . invest in BROWN & SHARPE PRODUCTION EQUIPMENT

Milling Machines	Machinists' Tools
Grinding Machines	Cutters and Hobs
Screw Machines	Magnetic Chucks
Arbors and Adapters	Vises and Pumps
Screw Machine Tools	Miscellaneous Equipment

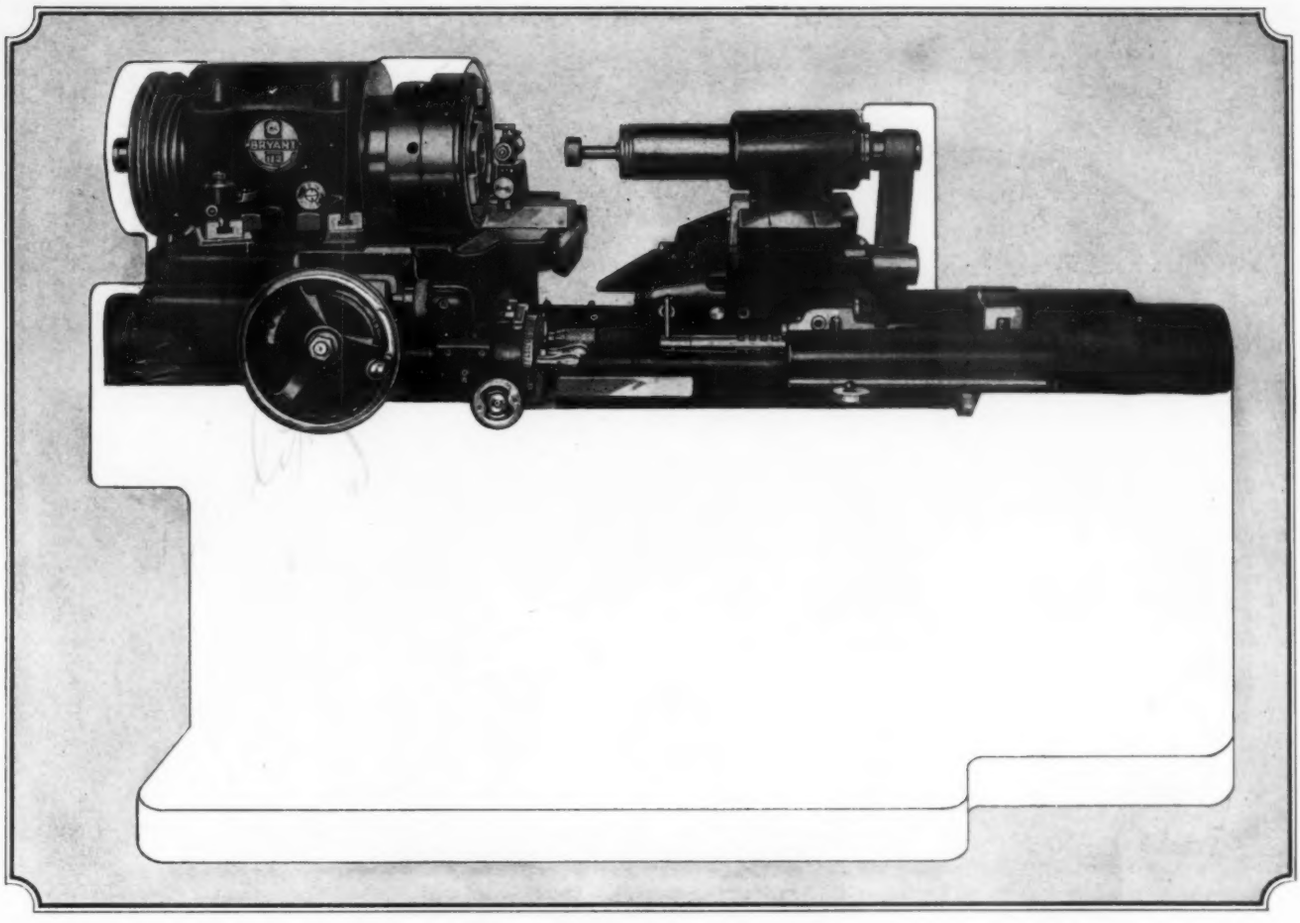
SHARPE


Your Wisest
Investment Today
. . . Better Equipment
. Machinists' Tools
Straight Edges · Surface Plates · Magnetic Chucks · Vises
Arbors, Collets and Adapters · · Cutters and Hobs
Ground Flat Stock · Pumps · Screw Machine Tool

—Use Catalog 33 as your buying guide for Quality Equipment.

BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

BROWN & SHARPE



THE NEW BRYANT 112 INTERNAL GRINDER

12″ SWING AND 12″ STROKE

With Underhead Slide Bar

The new Bryant 112 retains every familiar fundamental advantage of Bryant construction.

By locating the slide bar underneath the head, this new Bryant 12″ Model is cleared overhead, a feature which is considered desirable on certain types of work.

As in other Bryant Grinders, the wheel slide is supported by large rigid bearings at each end of slide bar, and a third bearing, attached to the wheel slide gives three point support. These bearings are fully protected from grit and dirt in all positions of the wheel slide. The workhead is adjustable to 45° angle making it possible to grind up to 90° tapers inclusive.

It is also possible to grind curved surfaces conveniently on this grinder.

Bryant 112 is another outstanding contribution by Bryant to low cost internal grinding. For descriptive literature, write:

Bryant Chucking Grinder Company

SPRINGFIELD, VERMONT, U. S. A.

HYATTS ARE *Right* IN THE CENTER OF ACTION

Inherent design advantages, uniformity, capacity and accuracy account for the wealth of Hyatt Roller Bearing applications in machine tools.

Where and when can we serve you?

HYATT ROLLER BEARINGS

ACTION *CENTERS* AT THE BEARING POINTS, where power meets load—where you must guard against friction, waste, wear, maintenance, replacements, shut-downs. And here, where the battle for efficiency is fought, Hyatt Roller Bearings are used with the utmost of confidence.

Confidence enriched by years of successful experience with these better bearings...confidence in correct bearing design, precision manufacture, sturdy construction, and sound application...confidence that in the centers of action Hyatts will always serve well and long. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, N. J., Chicago, Pittsburgh, Detroit and San Francisco.

"ALLIS-CHALMERS MOTORS HELP US TO PROTECT OUR REPUTATION"

Another true case history from the Allis-Chalmers files that proves **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**

Read what E. F. Kieckhefer, Vice-President, A. Kieckhefer Elevator Company, Says about Allis-Chalmers "Lo-Maintenance" Motors...How They Save Money...Build Customer Good Will! Get the Details on How You Can Cut Your Costs... Make Your Plant a Bigger Money-Maker with the Equipment that Pays for Itself!

You can't take chances with the motors you buy when you're in the elevator business! Breakdowns mean building traffic jams . . . tied-up freight . . . wasted time and wasted dollars! And you can't build customer good will that way!

The A. Kieckhefer Elevator Co., of Milwaukee, Wis., has built elevators for 56 years. And in that time they've built themselves an outstanding reputation throughout North and South America for elevators that set low cost maintenance records . . . that don't break down!

Can't Take Chances with Reputation!

That's why E. F. Kieckhefer, helps protect his company's reputation with Allis-Chalmers "Lo-Maintenance" Motors!

"You need motors in elevator work," he says, "that are tough . . . that can take the terrific abuse of repeated starting and stopping . . . without failing.

Selling Elevators Means Selling Service!

"And selling the service our motors will give is just as important as selling the elevators themselves. Our customers demand equipment that will stand up even under the most adverse conditions without money-wasting shutdowns!

"That's why for twenty-five years I've practically always specified Allis-Chalmers Motors for our equipment. Our customers get better service, saving money in maintenance costs. And we don't get complaints! Allis-Chalmers motors help us protect our reputation as builders of elevators that don't break down!"

Allis-Chalmers Guards Profit Margins!

Allis-Chalmers "Lo-Maintenance" Motors are some of the Allis-Chalmers equipment that protects profit margins in plants throughout the world. And Mr. Kieckhefer is one of the thousands of executives who have found it pays to buy the equipment that pays for itself!

Get the whole story! There's an engineer, trained in solving production problems, in the Allis-Chalmers District Office near you. Find out how he can put 90 years of engineering experience to work . . . to increase your profit margin with the equipment that pays for itself!

E. F. Kieckhefer checks specifications at his desk in the Milwaukee plant. BELOW: The elevator drum of a Kieckhefer installation with an Allis-Chalmers "LO-MAINTENANCE" motor.

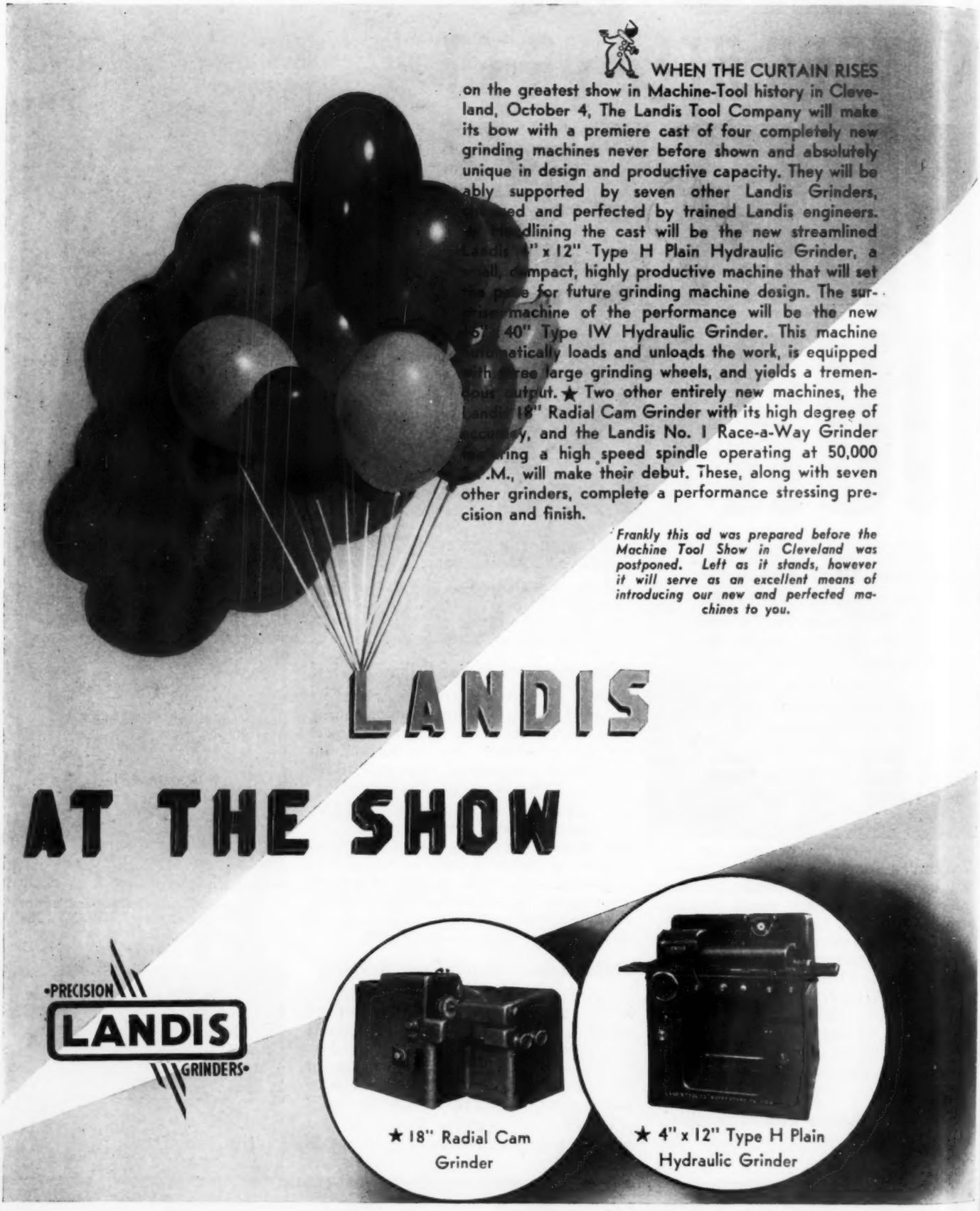
966

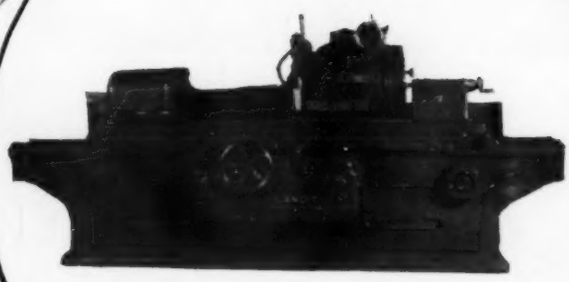
PRODUCTS ENGINEERED TO PAY FOR THEMSELVES

Electrical Equipment • Power Transmission Equipment • Steam and Hydraulic Turbines • Blowers and Compressors • Engines and Condensers • Centrifugal Pumps • Flour and Cereal Mill Equipment • Boiler Feedwater Treatment • Saw Mill and Timber Preserving Machinery • Crushing, Cement and Mining Machinery • Power Farming Machinery • Industrial Tractors and Road Machinery

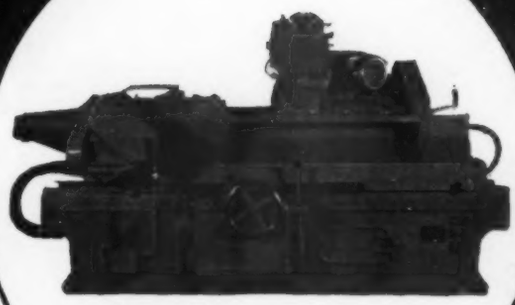
ALLIS-CHALMERS

MILWAUKEE · WISCONSIN


WHEN THE CURTAIN RISES
on the greatest show in Machine-Tool history in Cleveland, October 4, The Landis Tool Company will make its bow with a premiere cast of four completely new grinding machines never before shown and absolutely unique in design and productive capacity. They will be ably supported by seven other Landis Grinders, ed and perfected by trained Landis engineers. dlining the cast will be the new streamlined " x 12" Type H Plain Hydraulic Grinder, a all, compact, highly productive machine that will set e pace for future grinding machine design. The sur- machine of the performance will be the new 40" Type IW Hydraulic Grinder. This machine atically loads and unloads the work, is equipped ree large grinding wheels, and yields a tremen- utput. ★ Two other entirely new machines, the 18" Radial Cam Grinder with its high degree of y, and the Landis No. 1 Race-a-Way Grinder ring a high speed spindle operating at 50,000 .M., will make their debut. These, along with seven other grinders, complete a performance stressing pre- cision and finish.
Frankly this ad was prepared before the Machine Tool Show in Cleveland was postponed. Left as it stands, however it will serve as an excellent means of introducing our new and perfected ma- chines to you.
LANDIS
AT THE SHOW
•PRECISION LANDIS GRINDERS•
★ 18" Radial Cam Grinder
★ 4" x 12" Type H Plain Hydraulic Grinder

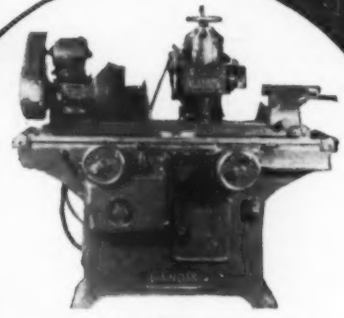


★ 14" x 36" Type C Hydraulic Universal Grinder



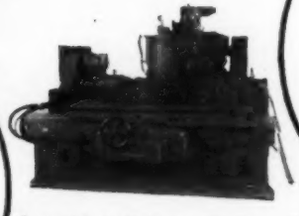
★ 5" x 40" Type D Hydraulic Cam Grinder

An all Star cast
to be seen at booth 5302
presented by
LANDIS TOOL CO.
WAYNESBORO, PENNA.



★ 12" x 28" Universal and Tool Grinder

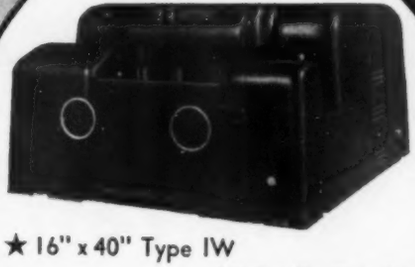
★ No. 2 RACE-A-WAY



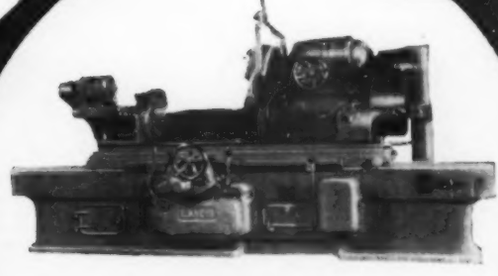
★ 10" x 36" Type C Camshaft Main Bearing Grinder

★ No. 1 RACE-A-WAY

★ No. 2 RACE-A-WAY



★ 16" x 40" Type IW Hydraulic Grinder



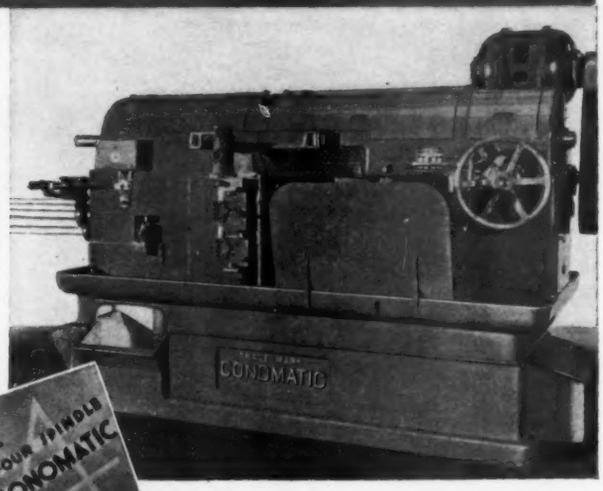
★ 10" x 48" Type D Plain Hydraulic Grinder

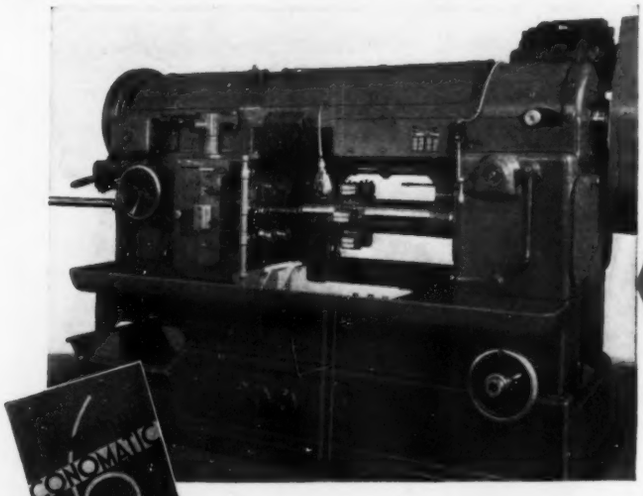
308

Nowhere else can you find as complete a line of Automatics as CONE now offers you. . . .

4-Spindle Conomatics

These machines — in 7 sizes from $\frac{7}{8}$" to $3\frac{1}{2}$" — assure accuracy, high production and economy in multiple operations on a wide range of work on bar stock. Accessibility in tooling and camming speeds set-up.





6-Spindle Conomatics

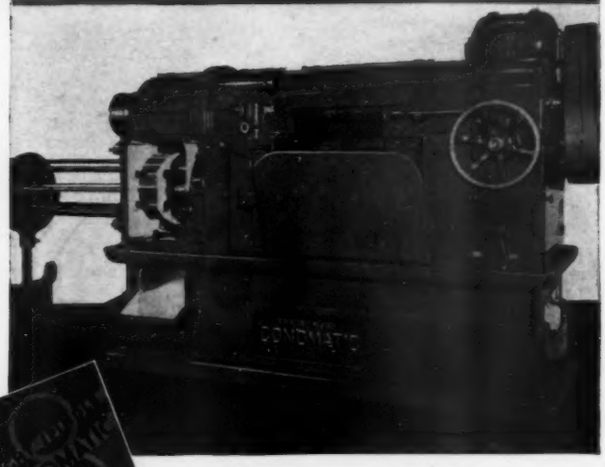
Built in six sizes. The $1\frac{1}{4}$" and $1\frac{1}{2}$" machines have a forming slide from $1\frac{1}{4}$" to $3\frac{1}{2}$" capacity. These machines have independent acting forming slides.

The 6-spindle Conomatic will impress the operator with its efficiency, the foreman with its flexibility, and the manufacturer with its economy and high production.

8-Spindle Conomatics

In 8-spindle Conomatics, the main members carrying power feed, spindle carrier, turret slide, cross slides and top bed are supported — on a heavily constructed base — a solid, rigid construction which assures accuracy on heavy cuts and fine quality finish. Made in 5 sizes from $1\frac{1}{4}$" to $2\frac{5}{8}$" for multiple work on bar stock.

Many years of experience in building 8-spindle Conomatics will prove to be helpful in reducing your machining costs.



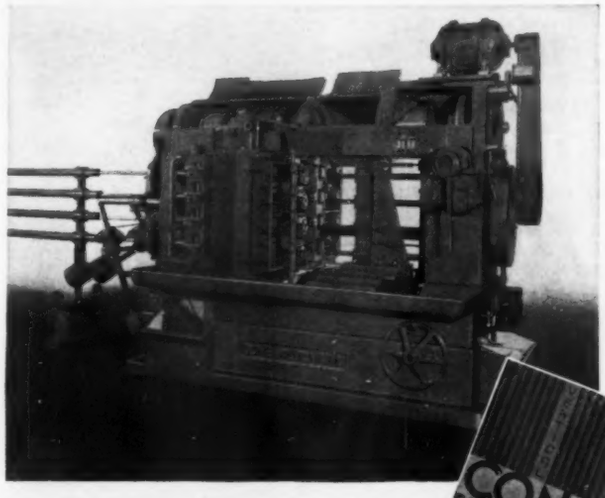
CONE Automatics

CONE AUTOMATIC MACHINE

You specify the part Let CONE supply the machine!

4-Spindle Automatics

These machines are designed for the same class of work as 4-spindle Conomatics but are of larger capacity. Made in 3½", 4⅜" and 6" sizes. Their stamina is achieved through massive construction in all castings. Positive stops permit large quantities of finished parts to be held within close limits.



Vertical 4-Spindle Automatics

Designed primarily for cutting off bar stock or tubing, these machines can be arranged for light forming, chamfering and drilling operations. Made in 4 sizes form 1" to 2⅝". When equipped with swinging stock stops, one end-working and two side-working, operations can be performed on each bar. A rigid, long-life, highly productive machine

5-Spindle Automatic Chucking Machine

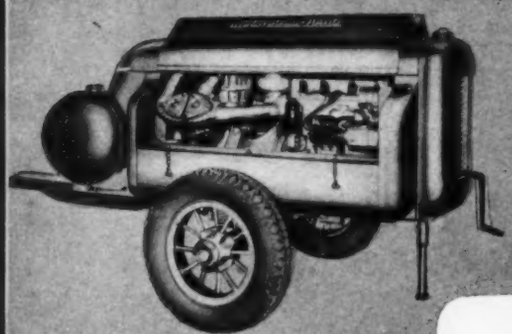
This 8¾" chucking machine is particularly adapted for machining forgings and similar work. Tool slide is a five sided turret for drilling, turning, etc. in all stations. Cross slides are adjustable for straight and angular forming or facing. Auxiliary spindles may be mounted for independent end working tools for drilling, reaming, threading, etc. Universal slide may be used for special tooling.

Lift the Burden of High Production Costs!

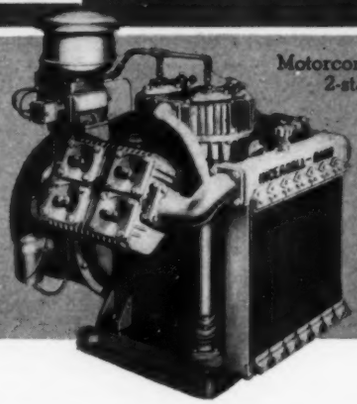
CO., WINDSOR, VERMONT, U. S. A.

MODERN MACHINE SHOP METHODS

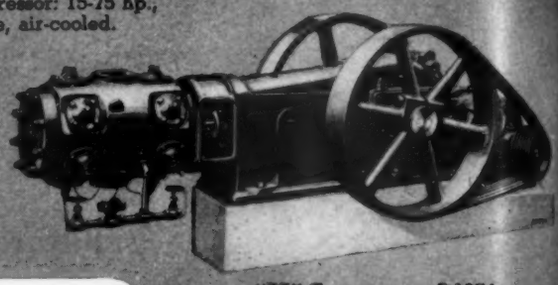
Require Modern IR *Compressed Air Equipment*



Portable Compressors: 55-425 cfm. Gasoline or oil engine.



Motorcompressor: 15-75 hp., 2-stage, air-cooled.



"ES" Compressors: 5-125 hp. Heavy duty, double-acting.

An accurate comparison of your existing machinery with new modern equipment may reveal many places where appreciable savings can be made. Also today's machines will probably increase your production, thus still further lowering costs. If you are not using late models, it will pay you to investigate them.

Ingersoll-Rand builds more than a thousand sizes and types of compressors, blowers and pneumatic tools of all kinds . . . there is a tool to meet each set of conditions most economically.

In addition to the popular Motorpump, I-R builds a complete line of modern pumps for all kinds of general service. Also available are the centrifugal and rotary types for circulating coolant liquids and cutting oils for use with all types of machine tools.

Let our engineers analyze your conditions. Their experience combined with yours may help you solve your problems. Literature on request.

Size 4G "Multi-Vane" Grinder.

Size 200 Chipping Hammer.

Size C Hoist with trolley mounting.

Class KRVF Coolant Pump.

Sizes 503 and 533 Impact Wrenches.

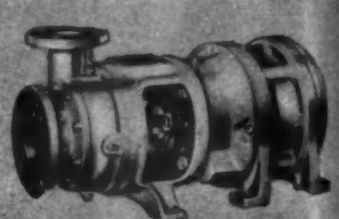
Size 14 Bench Rammer.

Class KRV Coolant Pump.

Size 3J Non-Reversible "Multi-Vane" Drill.

Motorblowers: 3-250 hp., 1-5 lbs., 300-15,000 cfm.

CAM-Pump with built-in motor.



Motorpump for general service.

Atlanta
Birmingham
Boston
Buffalo
Butte
Chicago
Cincinnati
Cleveland
Dallas
Denver
Detroit
Duluth
El Paso
Hartford
Houston
Kansas City

Ingersoll-Rand

11 BROADWAY, NEW YORK, N.Y.

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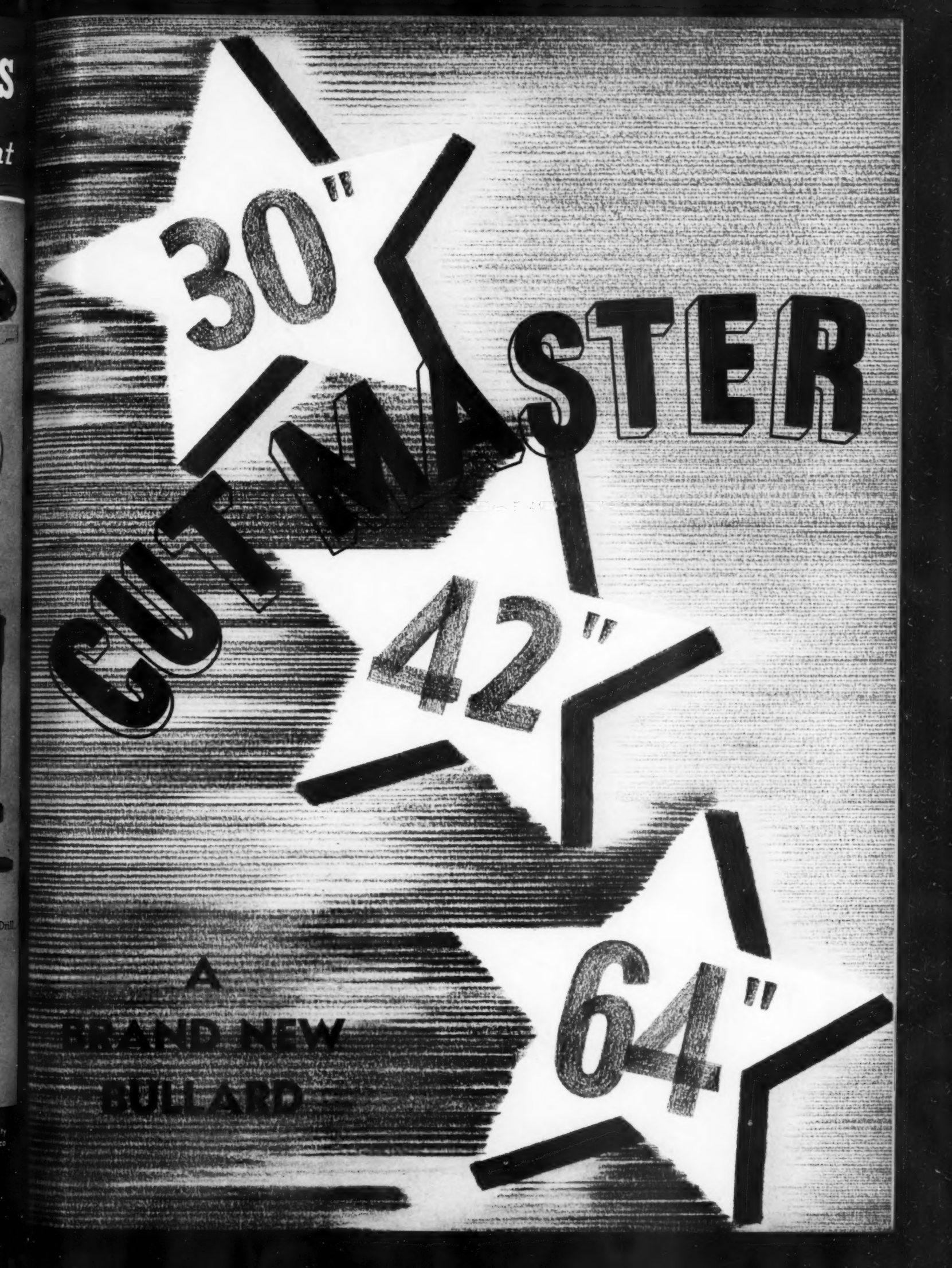
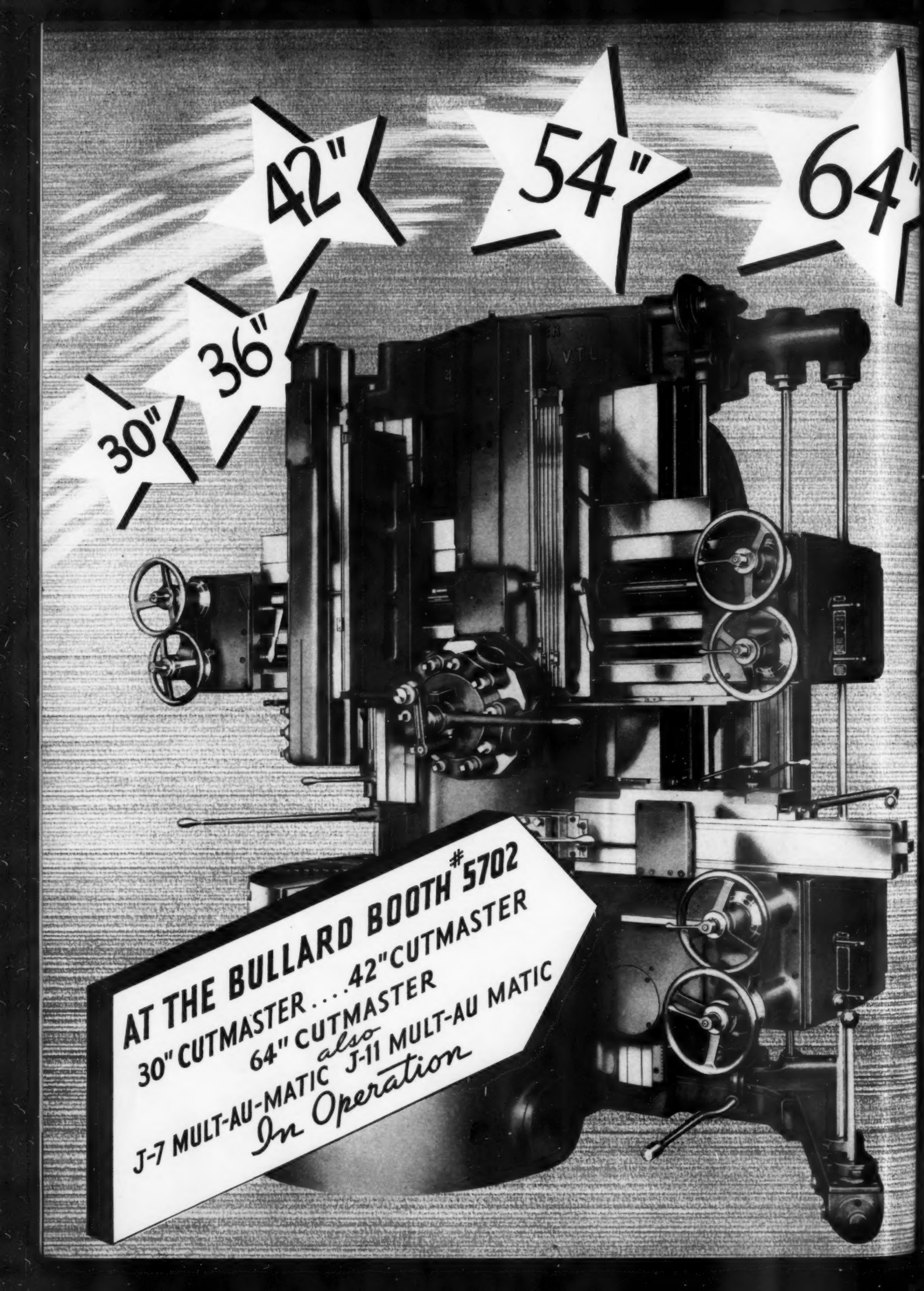
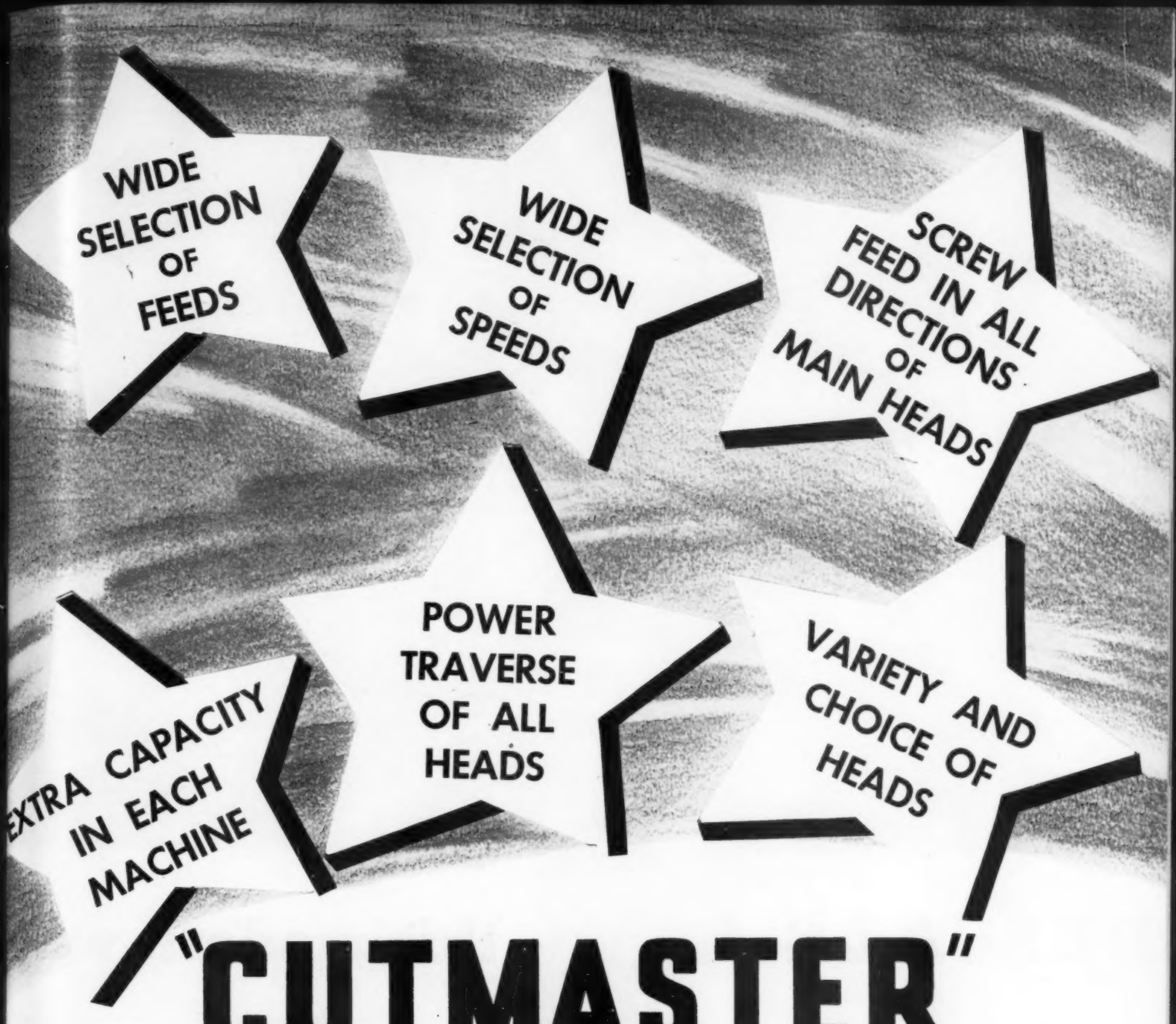
Washington

811-14


30"
CUTMASTER
42"
64"
A
BRAND NEW
BULLARD


30"
36"
42"
54"
64"
AT THE BULLARD BOOTH #5702
30" CUTMASTER....42" CUTMASTER
64" CUTMASTER
J-7 MULT-AU-MATIC also J-11 MULT-AU MATIC
In Operation


WIDE SELECTION OF FEEDS
WIDE SELECTION OF SPEEDS
SCREW FEED IN ALL DIRECTIONS OF MAIN HEADS
EXTRA CAPACITY IN EACH MACHINE
POWER TRAVERSE OF ALL HEADS
VARIETY AND CHOICE OF HEADS

"CUTMASTER"

Seeing is Believing

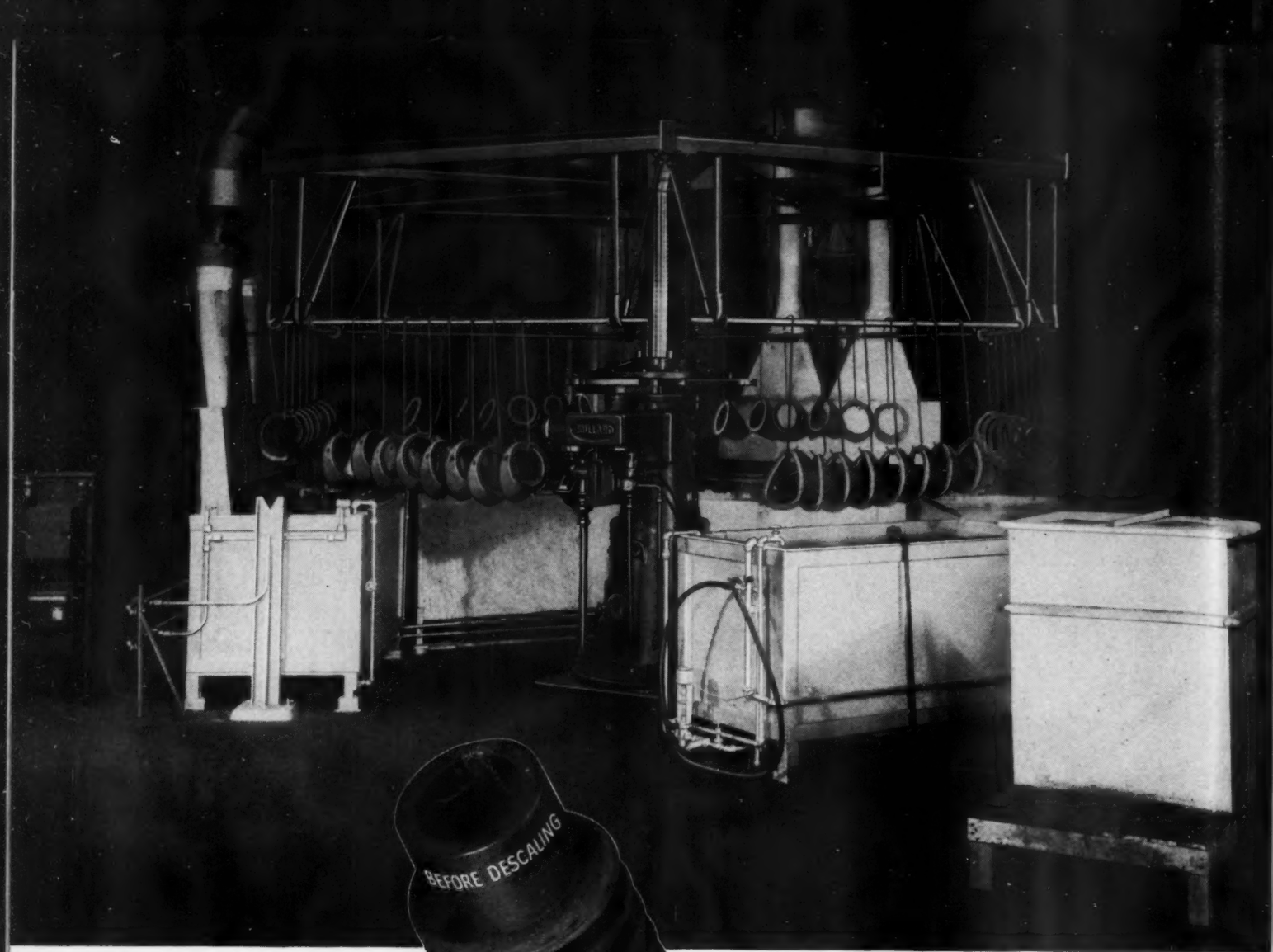
Over 50 years of experience in designing and building machine tools have gone into this new Bullard Vertical Turret Lathe.

The features listed, and many others which a personal inspection will disclose, have been developed out of that experience. Each does its part in making Cut Master a better, more efficient, and more economical Vertical Turret Lathe than you have ever before seen.

Seeing is believing. When you see three different sized Cut Masters actually at work you can quickly determine their merits for yourself. If you can't see them, you can easily send for the Cut Master catalog giving a complete technical description of the machine. But we hope you can actually see it—for *Seeing is Believing.*

THE BULLARD COMPANY
Bridgeport, Conn.

BULLARD



DESCALE this modern way

Check These Features . .

- Rapid and economical
- Easy to operate
- No dimensional changes
- No etching
- Descales recesses
- Produces chemically clean surfaces
- Savings in grinding time
- Long solution life
- Rust protection of parts after descaling

The Bullard-Dunn Process is an electro-chemical method of removing scale and oxide from ferrous metals. Simultaneously with the scale removal, a continuous metal film, usually tin, is deposited on the cleaned areas. This metal film completely protects the work from pitting and etching. This film can be removed easily, if desired, although it is usually advantageous to let it remain.

The Bullard-Dunn Process descales without dimensional change. It removes scale completely even from recesses. It produces chemically clean surfaces. It is easy to keep in continuous operation. Cost of operation is low.

Bullard-Dunn Process installations can be either manually operated or conveyorized. Note the Bullard-Dunn Station Type Conveyor illustrated above.

Write to The Bullard Company, Bridgeport, Connecticut, for the booklet giving more information about this unusual method of scale removal.

BULLARD-DUNN PROCESS

THE BULLARD-DUNN DIVISION of THE BULLARD COMPANY

BRIDGEPORT · CONNECTICUT

NEW Van Norman Hand Mill for the accurate and economical production of small and medium sized parts in your production department. Precision built . . . the Hand Mill has a heavy, rigid column . . . modern, sturdy construction . . . is powered for maximum metal removing capacity . . . has wide range of spindle speeds. Write for Bulletin.

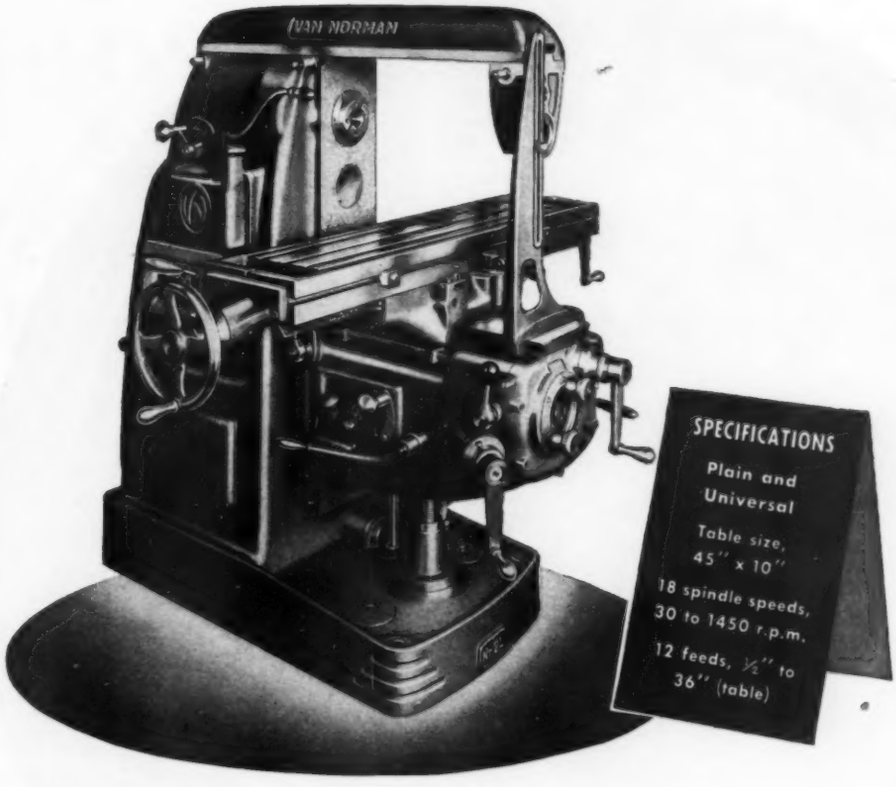
VAN NORMAN

MACHINE TOOL CO., SPRINGFIELD, MASS.

NEW No. 26 and No. 36 Ram Type Universal Milling Machines...bigger...heavier...greater rigidity...front and rear controls...6-way rapid traverse...greater selection and range of feeds and speeds...vertical, horizontal and angular milling without attachments, with fewer set-ups. Write for Bulletins.

VAN NORMAN

MACHINE TOOL CO., SPRINGFIELD, MASS.



NEW No. 2-L . . . a light model milling machine . . . plain or universal . . . front and rear controls . . . 6-way rapid traverse . . . wide range of speeds controlled by single lever selector . . . sensitive, accurate, compact . . . precision built...modern design, exceptional rigidity and dependability.

Write for Bulletin.

VAN NORMAN

MACHINE TOOL CO., SPRINGFIELD, MASS.

SPEED UP

your precision grinding

WHEN grinding to close tolerances, such as required in finishing certain automotive punches, you can increase production of uniformly accurate work by using Bakelite resinoid bonded abrasive wheels. Tough, free-cutting and even-wearing, they operate safely at higher speeds . . . remain accurate longer . . . require less wheel dressing. Write for illustrated, explanatory Booklet 14G, "High Speed Abrasive Wheels."

BAKELITE CORPORATION, 247 PARK AVENUE, NEW YORK, N.Y.
CHICAGO: 43 East Ohio Street. BAKELITE CORPORATION OF CANADA, LTD., 163 Dufferin Street, Toronto, Ont.
West Coast..Electrical Specialty Co., Inc., Los Angeles, San Francisco and Seattle

BAKELITE

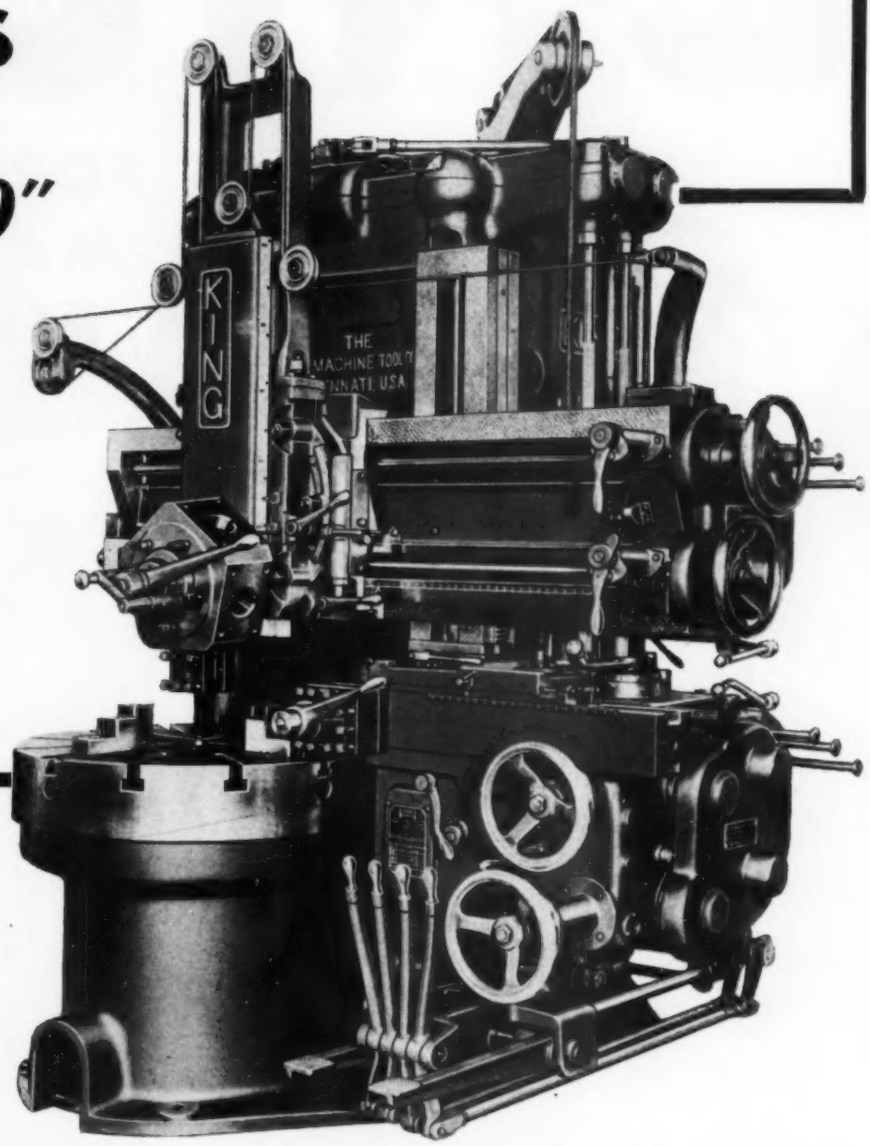
The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products.

BONDED WHEELS

VISIT THE BAKELITE EXHIBIT, HALL OF INDUSTRIAL SCIENCE, NEW YORK WORLD'S FAIR 1939

KING-

SHOWS THE *NEW 30"* VERTICAL BORING AND TURNING MACHINE



***A fast producer* on chucking work . . . .**

Be sure to see this NEW 30" machine with its turret adapted to quick tooling and with ample power to handle big outputs of chucking work with utmost accuracy and economy. Available also in a 36" size.

CONDENSED SPECIFICATIONS

Table Diameter 30" — Maximum Swing 34"
Maximum Height under rail 24" — Net Weight 20,000 lbs.

Of heavy duty construction throughout—anti-friction bearings—splined shafts for sliding members—spiral table gear—helical main driving gears—feed changes through sliding gears.

VALUABLE INFORMATION AVAILABLE FOR THE ASKING

THE KING MACHINE TOOL COMPANY

CINCINNATI OHIO

UNION

"The Tools You Buy Again"

FOR BETTER MACHINE PERFORMANCE

New developments in the art of metal-working raise still higher the already high efficiency standards of the machine tool industry.

Union contributes to improved metal-working practice with tools that are built with care and skill to bring out to the fullest extent the production possibilities of every machine tool. Choose Union for the business end of your equipment and get *all* the accuracy and productivity of which it is capable.

UNION TWIST DRILL CO., ATHOL, MASS.

S. W. CARD MFG. CO. DIV., Mansfield, Mass.
BUTTERFIELD DIV., Rock Island, Quebec
BUTTERFIELD DIV., Derby Line, Vermont

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Detroit: 6540 Antoine St.
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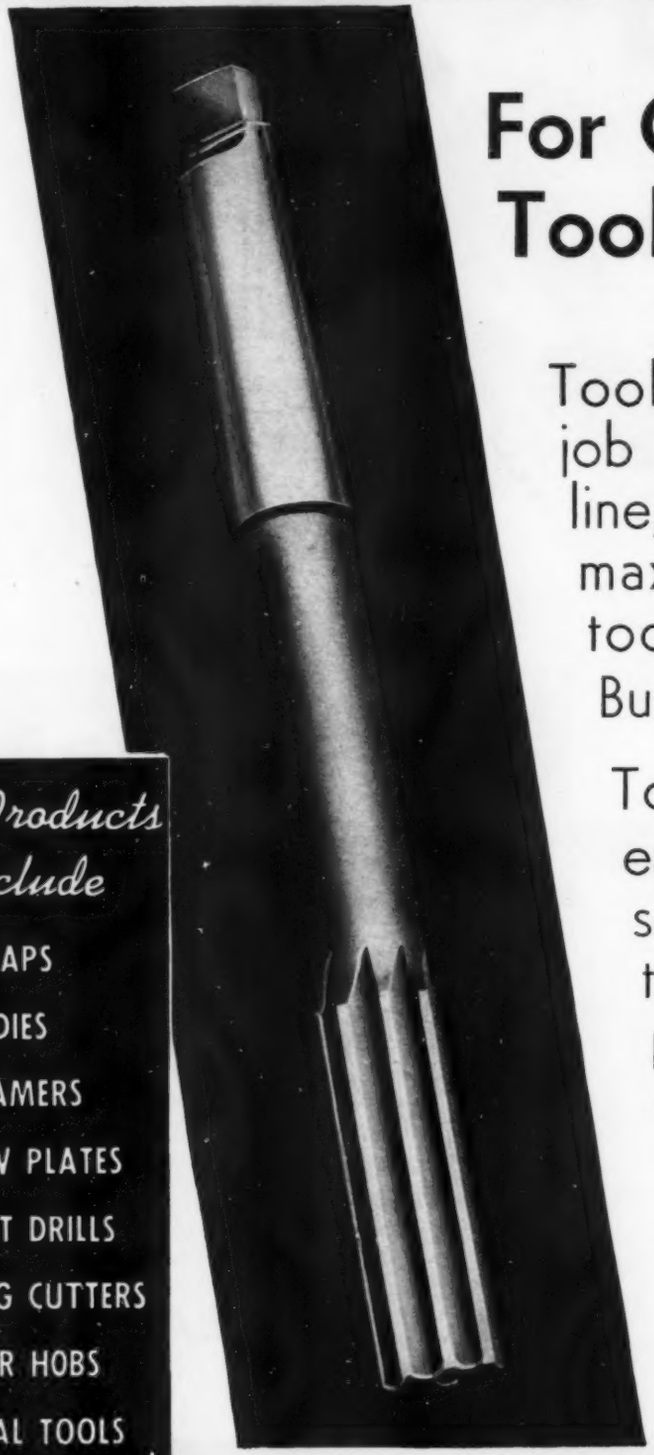
Los Angeles: 524 E. Fourth St.
Seattle: 568 First Ave. South

REAMERS *by* BUTTERFIELD



For Cost-Conscious Tool Engineers

Tool engineers whose job is to keep costs in line, as well as to provide maximum efficiency in tooling, will welcome Butterfield Reamers.

Tools designed to fit each job—built of steel selected to fit the function of each tool . . . the proper combination to deliver long, efficient service that means success in any cost-cutting program.

Our Products Include

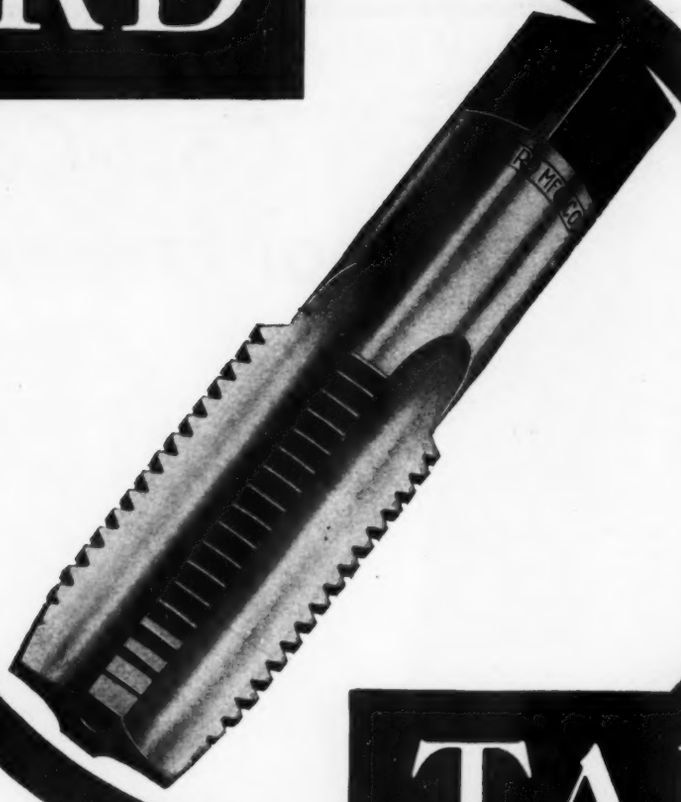
TAPS
DIES
REAMERS
SCREW PLATES
TWIST DRILLS
MILLING CUTTERS
GEAR HOBS
SPECIAL TOOLS

BUTTERFIELD DIVISION

FACTORIES: DERBY LINE, VERMONT—ATHOL, MASS.—MANSFIELD, MASS.
ROCK ISLAND, QUEBEC, CANADA

STORES: New York, 61 Reade St. Chicago, 11 So. Clinton St. Cleveland, Hal. W. Reynolds, 3346 Superior Ave. Detroit, 6540 Antoine St. Los Angeles, 524 E. Fourth St. Toronto, 49 Main St., Mimico. Montreal, 111 St. Paul St., West. Agents for Great Britain—Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol

CARD



TAPS

The TOOLS YOU BUY AGAIN

PUT your tapping problems up to the Card organization. For 65 years we have specialized in making Quality Taps—in showing manufacturers how to get better tapping results.

Our job doesn't end when we sell you a supply of Taps. If you wish, we will give your production individual analysis from every angle—preliminary drilling, lubrication, cutting speeds, resharpening—every point that will contribute to longer Tap life, improved machine performance and better threads.

AN EMBLEM OF QUALITY

The C.A.R.D. Quality

FOR 65 YEARS

S. W. CARD MFG. CO.

MANSFIELD, MASS., U. S. A.

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BOWER
ROLLER BEARING CO
Detroit, Michigan
BOWER
ENGINEERING DATA
A BEARING TYPE FOR EVERY BEARING NEED
BOWER MICRO-HONED BEARINGS

By shifting from lineshafts to individual Westinghouse drives on these countersinkers, McKinney has stepped up production, reduced handling costs, improved working conditions remarkably.

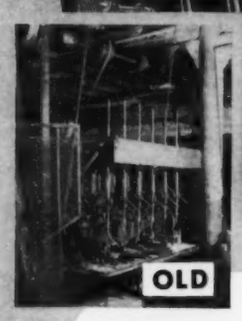
MODERN DRIVES PAY IN METAL-WORKING PLANT

McKINNEY MANUFACTURING COMPANY REPLACES OLD LINESHAFTS WITH DIRECT DRIVES — SPEEDS AND IMPROVES PRODUCTION — CUTS HANDLING AND POWER COSTS

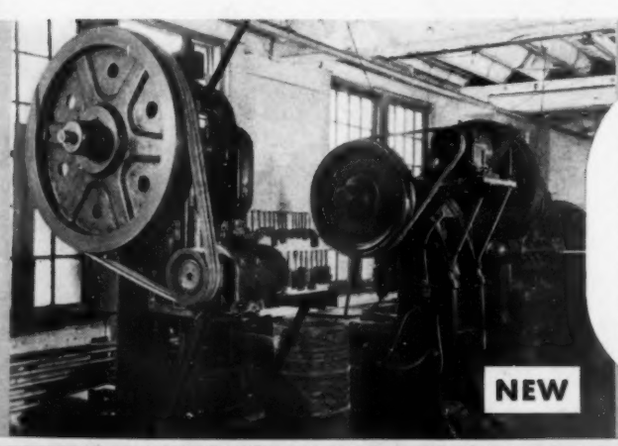
Modernizing with Westinghouse individual drives is increasing the "profit margin" in this large metal-working plant. Low power factor, caused by unbalanced loads, has been corrected. Production has jumped because machines can be located with more flexibility for "straight line" production. Handling costs have been reduced. Better lighting has improved quality of work. Absence of belts, less vibration and noise, have combined to make working conditions safer and more satisfactory.

Perhaps Westinghouse can help **you** improve your "profit margin." Call in or write the Westinghouse electrical wholesaler, industrial agent, or district office in your city.

Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pa.



Multiple drill presses are now driven by individual 3 hp Westinghouse motors — thus providing more efficient production methods, as well as more comfort and safety for operators.



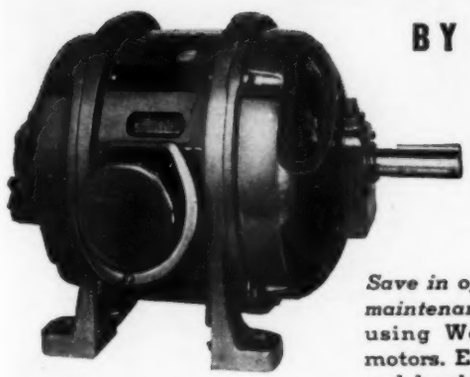
Unbalanced loads caused low power factor when a 40 hp motor drove equipment. Individual gearmotors increased production and flexibility, decreased power costs.

Westinghouse

W
WESTINGHOUSE ELECTRIC

STEP UP
"PROFIT MARGINS" *WITH MODERN EQUIPMENT*

GET MORE POWER PER DOLLAR BY MATCHING MOTORS TO THE JOB



STANDARD OPEN MOTORS

Save in operating and maintenance costs by using Westinghouse motors. Extra strength and durability in sealed sleeve bearings, one-piece frame and Tuffernell insulation.

GEARMOTORS

Save in first cost and operating cost with Westinghouse gearmotors that give you efficiency of high speed motors at exactly the required speed for the driven machine. Save power wasted in obsolete lineshafts and belts.

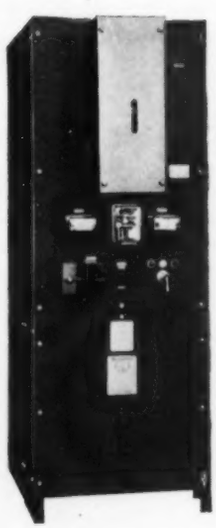
SAVE ON POWER BILLS AND OPERATING COSTS

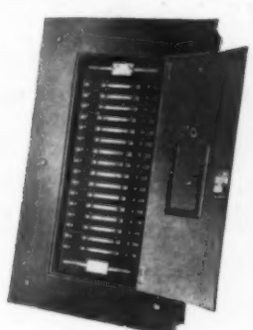
COMBINATION LINESTARTERS

◀ *Save maintenance costs on motors and control* with Westinghouse Combination Linestarters, providing all the advantages of Nofuze protection, plus motor control, in one compact, economically installed package.

CAPACITORS

Improve power factor and cut power costs by installing Westinghouse capacitors . . . reduce line drop and effect better line regulation . . . reduce circuit losses and decrease transformer losses. ▶





▲

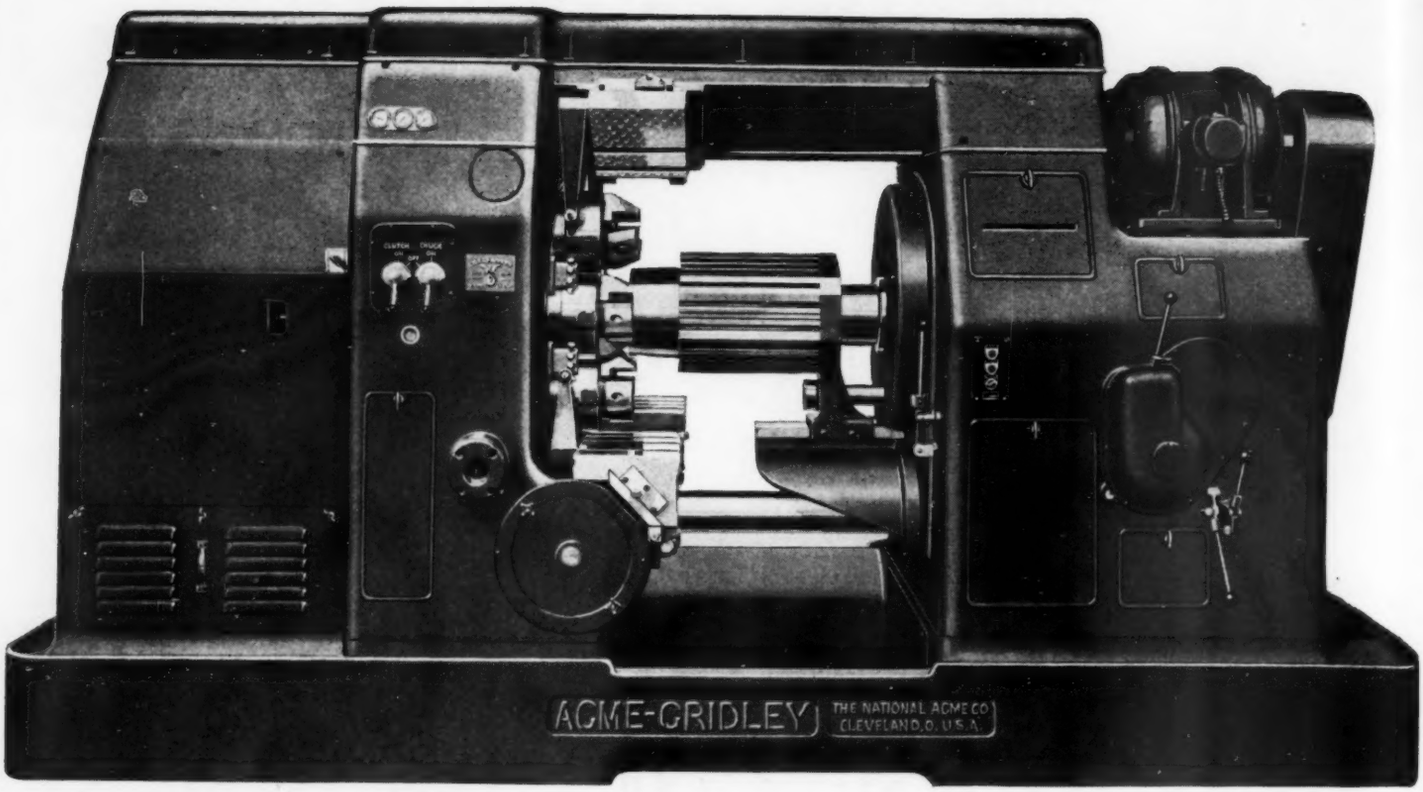
NOFUZE PANELBOARDS

Save on machine and man time with Westinghouse Nofuze Panelboards for lighting and power circuits. Immediate restoration of current, with no time lost for fuse replacements.

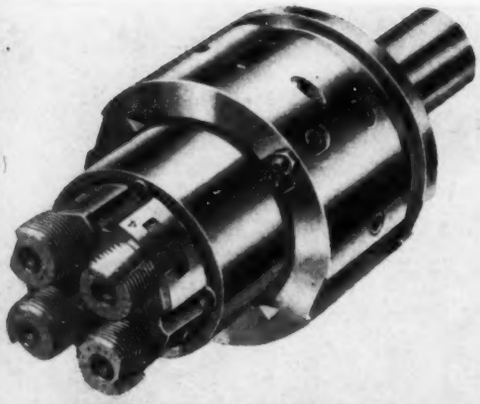
J-90230

Motors and Control

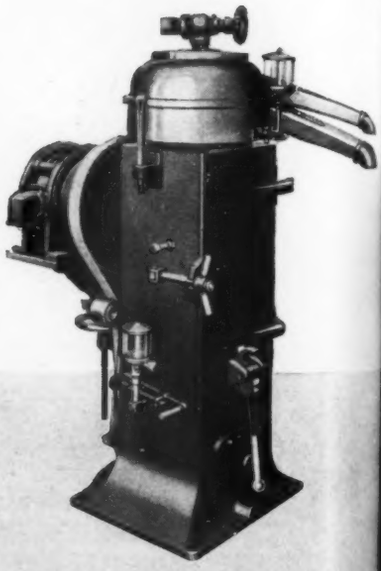
THE National Acme Show



• The *12-inch* 6 Spindle Chucking machine with mechanical speeds and feeds and full hydraulic chuck operation. The new Acme-Gridley 4-6 and 8 spindle chuckers are stepping up production as much as 5 times over former methods employed—sizes 4⅝ to 12".



Namco Circular Chaser Dies, and Collapsing taps — favored tools for production threading jobs. Circular chasers give 10 times the life of ordinary kind. See these economy tools — for every threading job.



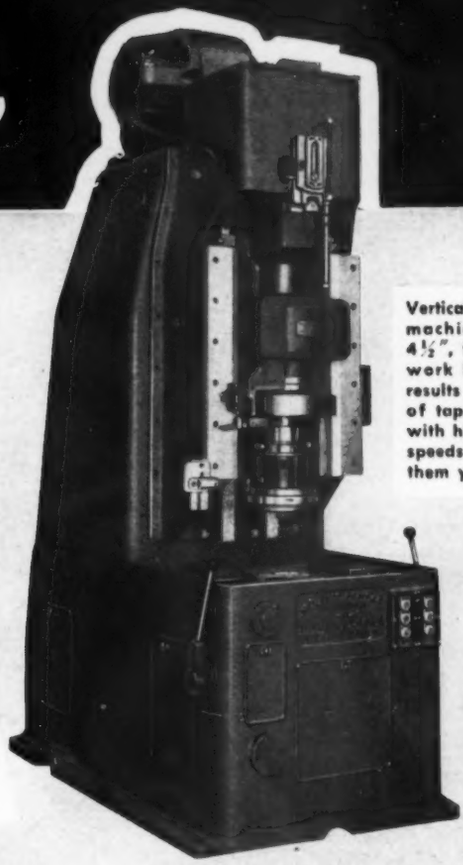
Positive Centrifuge — for oil reconditioning, quickly pays for itself in protecting machine life and cost savings for cutting, quenching, hydraulic or soluble oils. See it work.

...in Print...

✓ New Designs

✓ New Performance

✓ New Opportunities for Profit

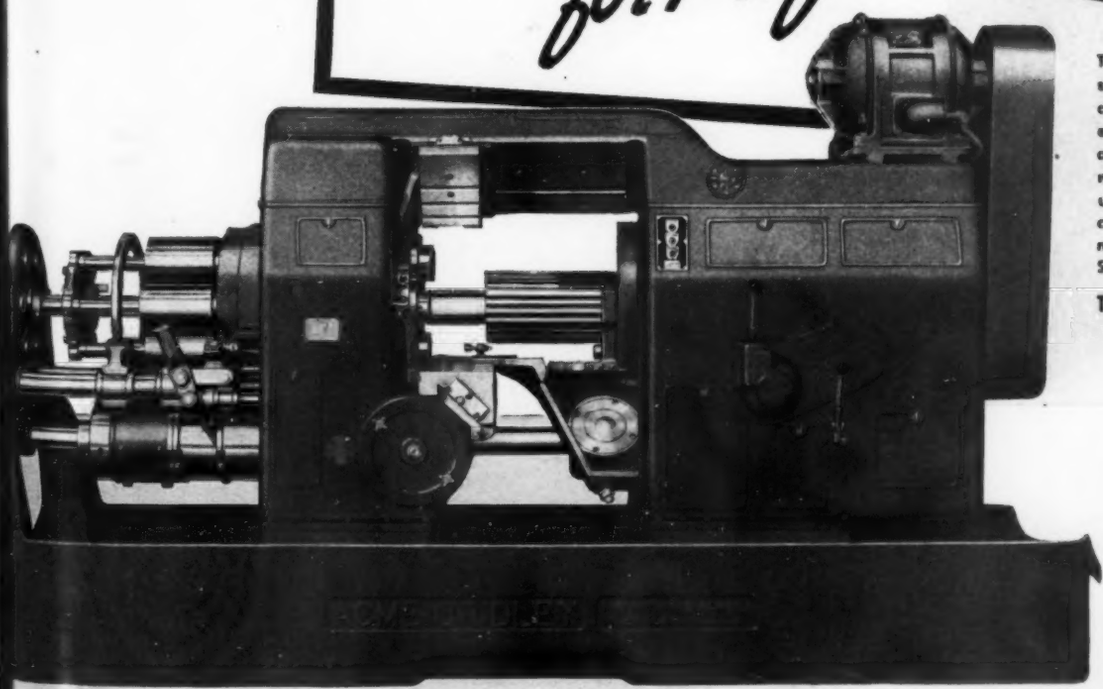


Vertical Tapping and Boring machines—for work 2" to 4½", featuring an indexing work holding chuck which results in positive alignment of taper bores and threads with high accuracy at record speeds. Step up and gauge them yourself.

The Chronolog—shows why, when and how long any equipment is idle, and gives an accumulated count of units produced. Increases production more than 10%. See them in action.

Snap-Lock Switch—adopted as standard equipment by many machine tool builders as the most dependable switch ever used for both heavy and light duty normal circuit work. Test one yourself.

THE NATIONAL ACME COMPANY
Cleveland, Ohio



Acme-Gridley 4-6 and 8 Spindle Bar Automatics demonstrating high tolerances at speeds and feeds as fast as modern cutting tools can withstand. Check speed and accuracy under power.

Postponement of the

MACHINE TOOL SHOW

emphasizes more than ever the necessity for MODERNIZING. Ask for the new catalogs on all this equipment you planned to witness.

Something New!

SHAVING

A NEW AND FASTER METHOD FOR SURFACE FINISHING

This is a Mill-N-Shaver, one of the machines we planned on having in operation at the Cleveland Machine Tool Show—write for Bulletin No. 580 describing different types of these machines.

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED
MACHINE TOOL CORPORATION
ROCHESTER, NEW YORK

Announcing

THE PUBLICATION OF AN

Important New Book

From head to ankles, the complete line of American Optical Industrial Safety Equipment is described in this compact, quick-reading catalog.

This book contains full information on how to order the proper type, size, and materials of equipment for every worker on every kind of hazardous job. And it will directly enable you to take advantage of all the benefits of concentrating all your purchasing requirements on one source . . . *under one responsibility for quality, promptness, service.* Everyone concerned with the safety of industrial workers should have a desk copy of this catalog for ready reference. And you can obtain *yours* by simply signing and sending the coupon *now.*

American Optical Company

***100 pages of useful information on the complete line of* American Optical Safety Equipment**

- EYE PROTECTION EQUIPMENT . . . For Every Hazard.
- WELDING HELMETS & HANDSHIELDS
- FIRST AID KITS
- RESPIRATORS, HELMETS, HOODS
- GLOVES, APRONS, LEGGINGS & SAFETY CLOTHING

AMERICAN OPTICAL COMPANY
SOUTHBRIDGE, MASSACHUSETTS

Without obligation, send me a copy of your new complete INDUSTRIAL SAFETY EQUIPMENT CATALOG.

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.....

A.M.

Announcing

The HASKINS TYPE "C" TAPPER

A SIGNIFICANT MACHINE TOOL DEVELOPMENT

Entirely NEW
Entirely DIFFERENT
Completely AIR CONTROLLED

Not until the first Haskins Tapper introduced such revolutionary features as "no-float" spindle and foot pedal control, did tapping equipment begin to keep pace with machine tool progress. Now, in the new Type "C" Tapper, Haskins presents *another* notable advancement; introducing for the first time a completely practical combination of speed with fine precision and great sensitivity. Completely air controlled, it is a *really modern* machine tool—a real contribution to top production efficiency and low production costs.

WRITE FOR FREE BOOKLET

The Haskins Type "C" Tapper—built in three capacities and available in single and two-spindle units — appropriately commemorates the Twentieth Anniversary of R. G. Haskins Company. Bulletin No. T-2 will give you all the facts about this history-making new machine. Write for it now. R. G. Haskins Company, 2760 W. Flournoy Street, Chicago.

HASKINS PRECISION *Tapping Equipment*

HASKINS

YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS

NEW!

- **NEW COMPACTNESS**
  ...streamlined to take less space
- **NEW EASY OPERATION**
  ...bigger buttons, shrouded for safety
- **NEW EASY INSTALLATION**
  ...numbered terminals, more wiring space

Safer operation — more convenience — and in less space!

That's what this new, modern Westinghouse Type SD push button offers. Its rounded, molded cover gives a permanent finish that won't wear off. Its smaller case with larger buttons saves space yet gives ample room for wiring. Installation is made easy by knockouts in both ends and clearly marked terminals. Shrouding protects the buttons from accidental operation.

Get the new Westinghouse bulletin showing the types and styles of Type SD push buttons available for various circuit requirements. Ask for bulletin 15-020. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

SAFETY LATCH GIVES PROTECTION TO OPERATOR

Buttons can be supplied with safety latch to hold or lock circuit open.

TYPES AND MOUNTINGS FOR ANY USE

Multiple unit stations, rotary selector switches, flush mounting types and water-tight cases provide units for many control circuit uses.

J-20880

Westinghouse
Type SD Push Buttons

W
WESTINGHOUSE ELECTRIC

AS THE WICK FEEDS THE FLAME

So do millions of tiny graphite wicks feed the surface of TIMKEN Graphitic Steel and provide a non-scuffing, non-scoring, evenly-lubricated surface.

This unique, self-lubricating characteristic makes TIMKEN Graphitic Steel especially desirable for use in tools and dies. It has an outstanding record of resistance to wear against abrasive action.

The graphitizing action to which TIMKEN Graphitic Steels are subjected, produces a physical structure that machines smoothly and responds readily to heat treatment.

Specific information concerning various grades of Graphitic Steel available from following distributors or direct:

A. Milne & Co., New York, Boston, Chicago, St. Louis
Coulter-Sibbett Steel Co., Oakland, Calif.
Craine-Schrage Steel Co., Detroit, Mich.
Hamilton Steel Co., Cleveland, Ohio
F. H. Currie, Los Angeles, Calif.
Quality Steel Co., Dayton, Ohio

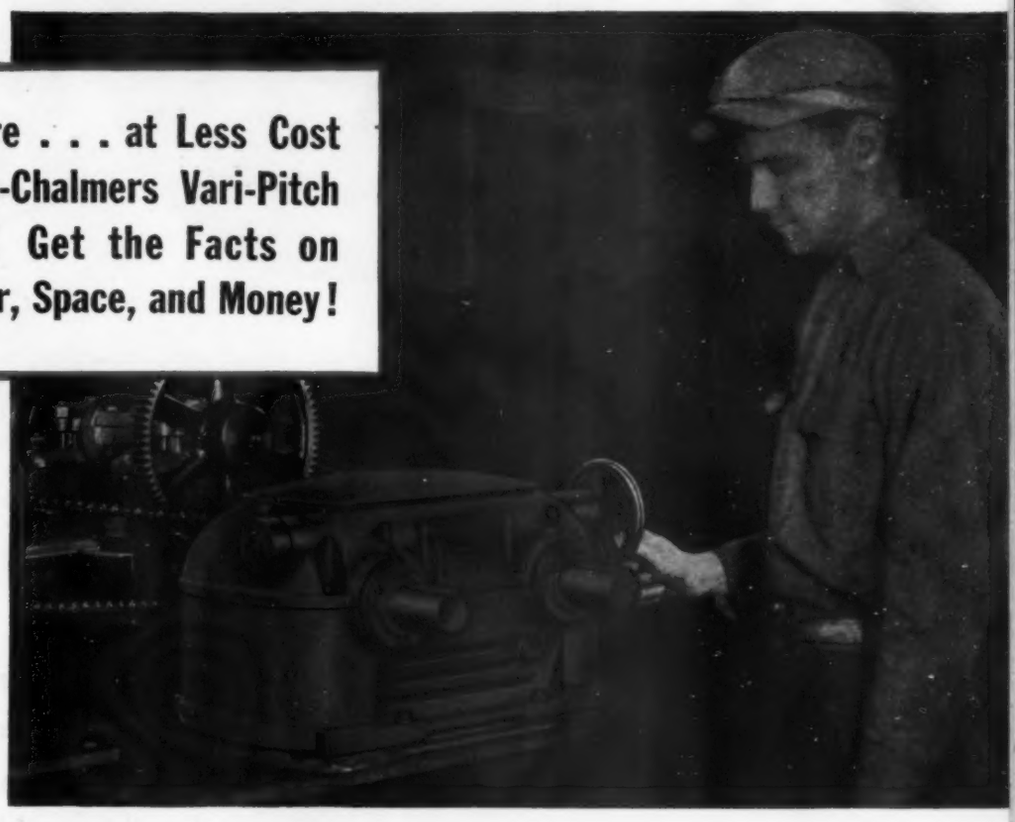
PHOTOMICROGRAPHIC PICTURE OF 1/8 INCH CROSS SECTION OF GRAPHITIC STEEL MAGNIFIED 500 TIMES

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division

TIMKEN
ALLOY STEELS

PRODUCTION COSTS GO DOWN WHEN YOU MAKE YOUR MACHINES MORE FLEXIBLE!

Your Machines Produce More . . . at Less Cost . . . When you Put the Allis-Chalmers Vari-Pitch Speed Changer on the Job! Get the Facts on How it Saves You Time, Power, Space, and Money!



Think what it would mean to you in improving your production schedule if you could run your machines at *exactly* the speed to give you best results . . . and be able to change that speed Up or Down — instantaneously — to suit changing conditions!

And yet that's what the Allis-Chalmers Vari-Pitch Speed Changer is doing for hundreds of industries! And that's what it can do for you!

This variable speed changer is NEW ... and it gives you NEW production advantages . . . production advantages that have never before been available. For the Vari-Pitch Speed Changer has no steps requiring adjustments . . . no springs or gears to wear . . . no guesswork on the operator's part.

Saves Space . . . Time . . . Power!

You don't need to stop the machine to get the speed you want...you merely turn the hand wheel (or flick a switch) . . . and the change in speed is made to the smallest fraction of an rpm.

Not only that—the Vari-Pitch Speed Changer is extremely compact . . . takes only ¼ to ⅓ the space used by bulkier transmissions. And through high efficiency operation, it makes big savings on power costs — an important factor that production men appreciate.

Find out about the Allis-Chalmers Vari-Pitch Speed Changer . . . how it operates to save you money . . . how it is built to give you years of profitable service. Get in touch with the transmission engineer in the Allis-Chalmers district office nearest you . . . or send for Bulletin 1266A.

BY SYNCHRONIZING A CONVEYOR and Shear used in cutting bats of steel wool, this Vari-Pitch Speed Changer provides exactly the right speed *at all times* . . . keeps production schedules steady . . . reduces production costs!

Available in sizes from 1 to 75 hp, ratios up to 3¾ to 1, maximum output speed 3500 rpm, the Vari-Pitch Speed Changer is a product of Allis-Chalmers, originators of the Texrope Drive and the Vari-Pitch Sheave.

A-1132

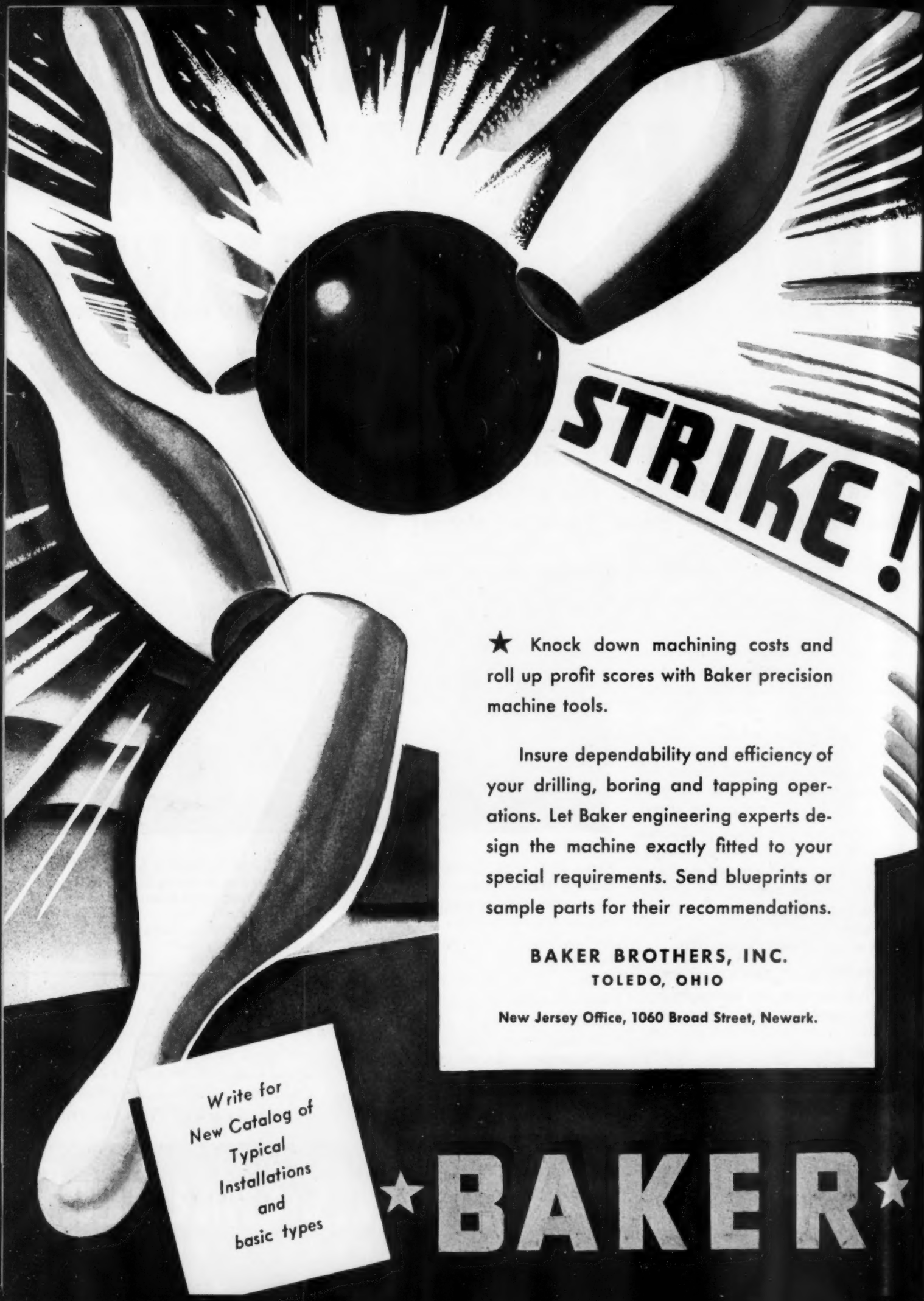
Vari-Pitch Speed Changers • Texrope V-Belts • Duro-Brace Texsteel Sheaves • Vari-Pitch Sheaves • Standard Cast Iron Sheaves • Adjustable Pitch Diameter Texsteel Sheaves • 2-3-4 Combination Sheaves • Straitline Automatic Motor Bases • Oil Field Drilling Rigs

Belts by Goodrich

TEXROPE DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN



★ Knock down machining costs and roll up profit scores with Baker precision machine tools.

Insure dependability and efficiency of your drilling, boring and tapping operations. Let Baker engineering experts design the machine exactly fitted to your special requirements. Send blueprints or sample parts for their recommendations.

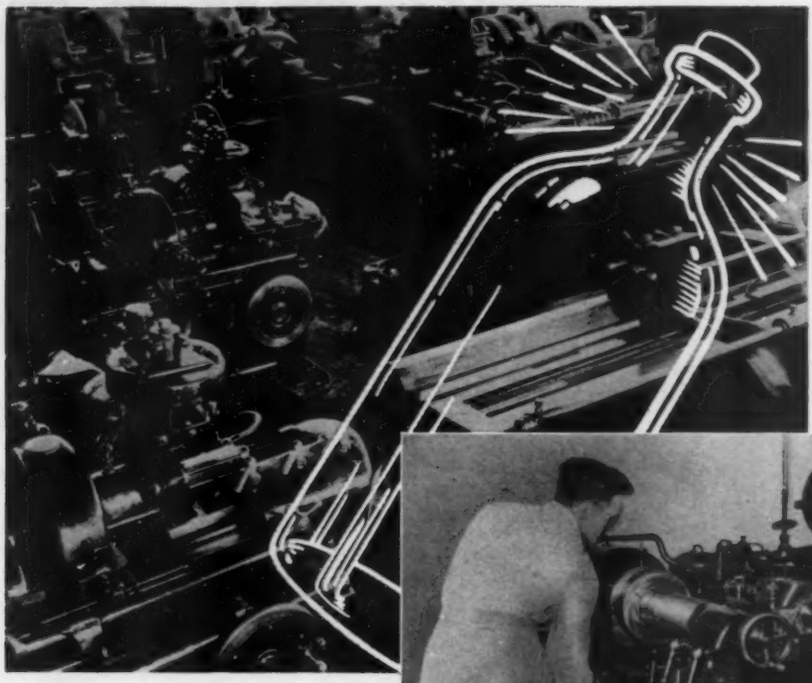
BAKER BROTHERS, INC.
TOLEDO, OHIO

New Jersey Office, 1060 Broad Street, Newark.

Write for New Catalog of Typical Installations and basic types

★BAKER★

Eliminate Bottle Necks...



• Lees-Bradner heavy thread millers, due to their inherent capacity to more rapidly produce accurate work, eliminate the bottle neck found in many plant's threading departments.

Why not investigate these new tools capabilities as applied to your threading problems? A Lees-Bradner representative is located near you.

• • • THRU FASTER, MORE ACCURATE PRODUCTION

The LEES-BRADNER Company

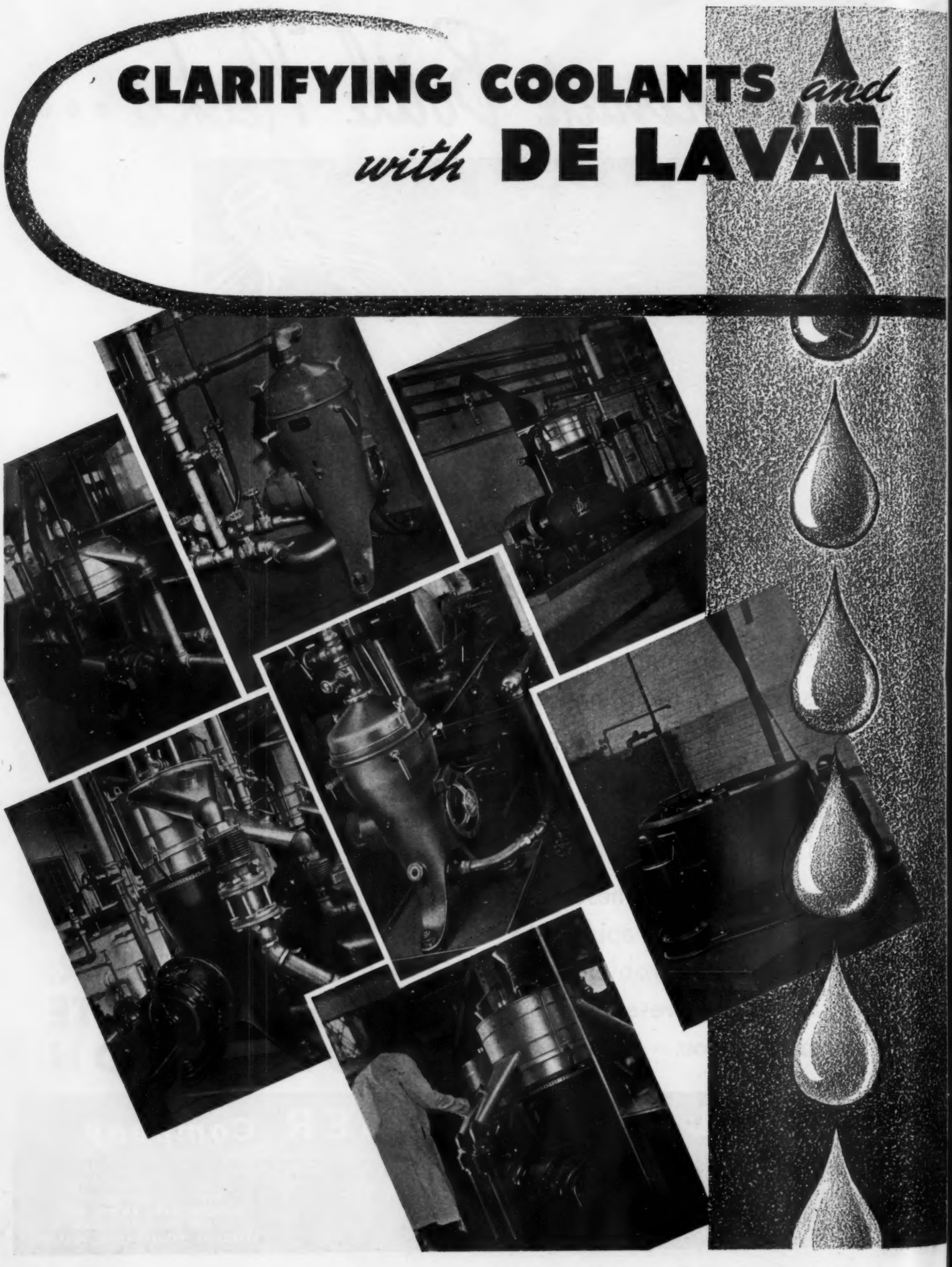
Manufacturers of Thread Milling Machines, Single Spindle Gear Hobbing Machines, Rotary Hobbing Machines, Gear Grinders and Gear Testers

CLEVELAND . . . OHIO

English Representatives:
THE CATMUR MACHINE TOOL CORPORATION
LONDON, ENGLAND

French Representatives:
DUFOUR PERE FILS & CIE.
11 RUE NUEVE DE VILLIERS
LEVALLOIS, PERRET, SEINE, FRANCE

CLARIFYING COOLANTS *and* *with* DE LAVAL



PURIFYING FACTORY OILS
CENTRIFUGALS
... are modern practice in shops seeking MORE and BETTER work at LOWER COST

Clean coolants assure better finish, increased production

Removal of metallic and abrasive particles from coolants with the De Laval Coolant Clarifier enables grinding to closer limits, results in finer finish, makes possible the use of softer wheels and prolongs wheel life. Obviously, the De Laval System enables coolant to be used over and over again without becoming charged with impurities and materially reduces the hazard of infection among workmen.

More efficient extraction and purification of cutting oil

Worthwhile savings in cutting oil can be realized by employing the De Laval extractor to more completely extract the oil from chips and turnings; longer tool life and higher permissible cutting speeds are possible by purifying the oil by means of a De Laval Oil Purifier. By constantly returning purified oil to the system, all of the oil in service is maintained in cleaner condition with beneficial results.

Purification of washing and slushing oils safeguards product, lowers costs

The De Laval System provides a low cost means of purifying washing and slushing oils by removing impurities picked up during the processes. Oil in continuous systems is used over and over again at full efficiency. Oil used in coating of parts before packing is rendered moisture and dirt free, insuring protection against rust and dangerous abrasive particles.

Block tests are safer, less costly when oil is purified

The De Laval Oil Purifier provides an efficient means of continuously removing metallic particles, grit and water from lubricating oils in circulating oil systems. Purification of automobile engine block test oil—a typical application of this system—results in cleaner motors, fewer rejections and oil savings. It has also been found that when oil is continuously purified, motors can be safely assembled into cars without removing the oil pans after testing—an important time-saving feature.

Other services and savings to metal working industries

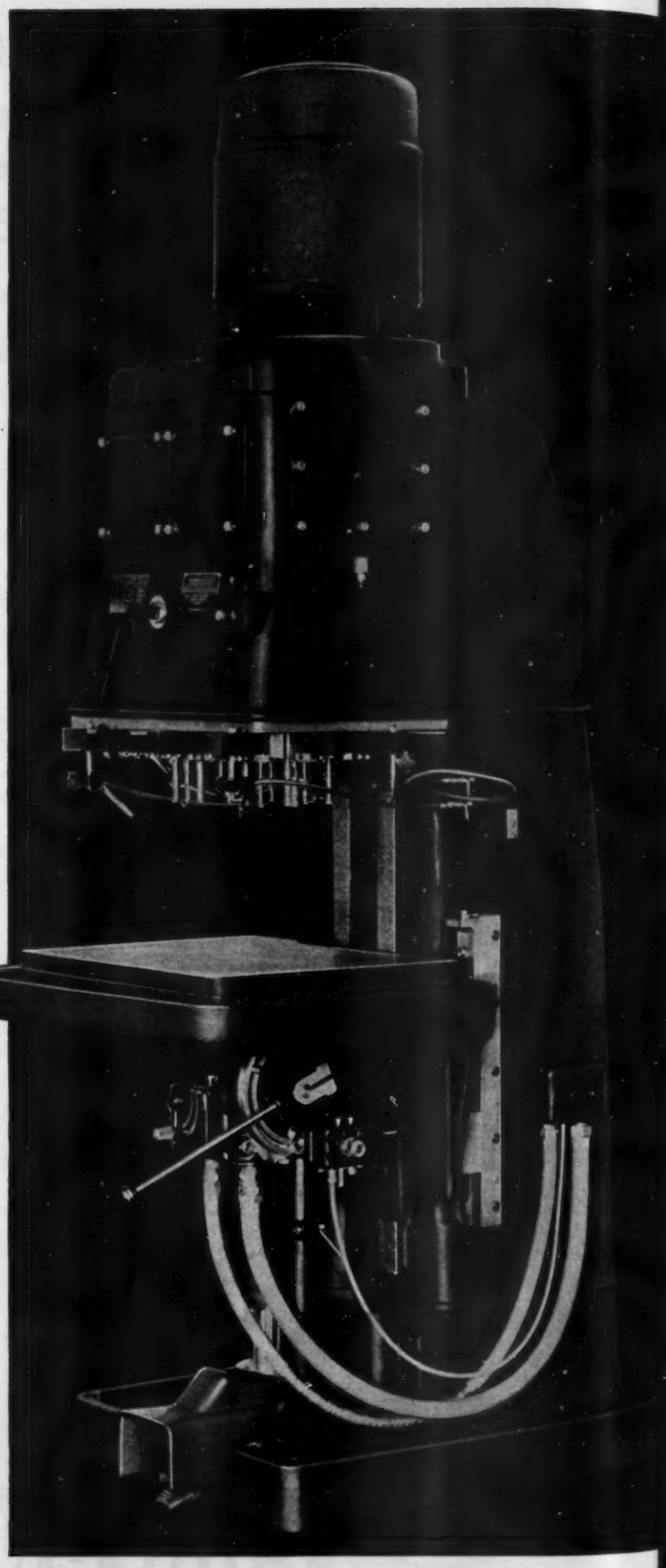
De Laval Centrifugal Equipment is available for removing solid matter from honing oils, purifying hydraulic press oil, quenching and tempering oils as well as liquid coolants and seals involved in such operations as rolling, drawing, cooling, compressing and exhausting. You are invited to submit your problem to De Laval engineers with the assurance that you will benefit by their wide experience.

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York — 427 Randolph St., Chicago
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco
THE DE LAVAL COMPANY, Limited
Montreal — Peterborough — Winnipeg — Vancouver

DE LAVAL
COOLANT CLARIFIERS

BRAND NEW!

—this Leland-Gifford Multiple Adjustable Drilling Machine



To meet the universal demand for really NEW developments in the art of drilling, the Leland-Gifford Company announces this new machine—THE MULTIPLE SPINDLE ADJUSTABLE SPINDLE DRILLING MACHINE—which is primarily designed to increase the flexibility of operation and, at the same time, boost production.

In this way: (1) A hand controlled hydraulic feed, requiring only finger tip pressure, imparts to the table the exact motion of the hand, both as regards height and speed of travel. All motion stops the instant the feed lever motion is stopped. (2) Disconnecting this hand controlled hydraulic feed, a conventional type hydraulic feed can be employed, providing a single cycle of rapid approach to drilling position, a drilling feed, and a rapid return. Pressure on foot treadle makes this an automatic cycle. (3) Rates of drilling feeds range from ½" to 150"/min., with an approach of 240"/min. (4) Upper and lower Universal Joints are automatically lubricated. (5) Direct drive from four-speed fan cooled motor. Two speed gear ratio to spindle, providing 8 spindle speeds ranging from 830 to 4500 r.p.m.

Additional Leland-Gifford features—fully described upon application—make this Multiple Adjustable Drilling Machine extremely valuable as a time- and money-saving tool for high production output. Built in 3 sizes—12, 16 and 24 spindles—⅜", ½" and ⅝" diameter spindles. Write today! No obligation.

LELAND-GIFFORD COMPANY
WORCESTER, MASS., U. S. A.

THIS TIME- FOR HIGH BORING AND TURNING EFFICIENCY

AT- LOW BORING COST

STARRING- **THE NEW CINCINNATI BORING MILL**

● Here is an opportunity for the discriminating purchaser to insure immediate returns on his investment.

This unit has been designed by Cincinnati Planer to meet definite profit-for-the-customer specifications based on years of quality machine tool manufacturing. With the wisdom and thoroughness of experience, Cincinnati engineers and designers have bound together all the efficiency and profit promoting characteristics of their present line of boring mills and combined these with new revolutionary features to give you assured Cincinnati quality.

This *initial* showing is carrying on the traditional continuous *showing* of profits that satisfied users have realized with quality Cincinnati Planers, Boring Mills and Combination Planer-Millers.

Don't hesitate to drop us a line concerning this new addition to the Cincinnati Planer family. We'll be only too glad to provide you with complete information about this, and other economical Cincinnati units that will aid you in realizing a profit with your heavy machining operations.

The CINCINNATI PLANER Co.

CINCINNATI OHIO U S A

The WEAPONS OF DEMOCRACY

A message to the men who operate machine tools

● The tools you operate are both the weapons and the badge of democracy and freedom.

You and I and everyone have to *earn* the right to existence. Only weaklings and thieves wail that "the world owes us a living."

Out of what you produce comes —first—your wage, then the taxes for the right to live in freedom, and then a small wage to the capital which buys and maintains the place in which you work. The more you produce and the better your product, the more you are worth to society and the more you will earn. That's the difference between *Democracy* (where everyone is judged on his own merits and everyone has the chance to rise to the top of the heap), and *Dictatorship* (where everyone is dragged down to the level of the poorest and everyone works for the state instead of for himself and his family).

In Democracy we believe in giving a workman better and better tools, so that he can produce more and better work—and so earn more, progress further, take greater pride in his own accomplishment. The entire history of America proves that better tools reduce prices, broaden markets, make possible more luxuries for more people, and so increase employment.

New Warner and Swasey turret lathes make you worth more because they help you produce more *with less effort,* and they help stabilize employment by reducing costs and so helping your employer hold markets in the face of rising taxes and material prices.

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY TURRET LATHE

WHAT'S IN THIS ISSUE

Modernization of plant equipment is a phrase which is bandied about a good deal, hence has become pretty hackneyed. But actually, how modern is industry's equipment today—which is to say, how efficient is U. S. industry? Every five years *American Machinist* makes an exhaustive survey revealing the age of equipment. The next survey is due in 1940. Meanwhile we have arrived at an estimate of where industry stands on this vital point. For the facts, turn to page 704 and read "It's Smart To Be Modern."

The Show-in-Print tells you about all the new machines which you would have seen at Cleveland had the Machine Tool Show been held. An easy and painless way to get acquainted with the new designs is to sit down in your office or in a big chair at home and look over the descriptions starting on page 707. Just to give you an idea of the well-rounded character of the Show-in-Print section, 85 companies are represented with a total of 138 machines. After you have read the section, better file it for future reference.

What's happening at Washington these days? Plenty. The European war has turned things topsy-turvy, nowhere more than at our national capital. How has the war affected national defense plans? What is the hot news from Washington? You've only to leaf over to page 806b to get the answer. Our own Washington Bureau brings you latest developments which may affect your business.

A flood of orders is reported by many metal-working companies in the last two weeks. Is that typical of what is happening in machine tools, in steel, in farm implements, in railroad equipment? Turn to page 806a for the answer.

Armory Show was to have been staged in Cleveland simultaneously with the Machine Tool Show by a group of companies. But it was cancelled, too. However, beginning on page 796 *American Machinist* describes what you would have seen at the Cleveland Armory had the show gone on.

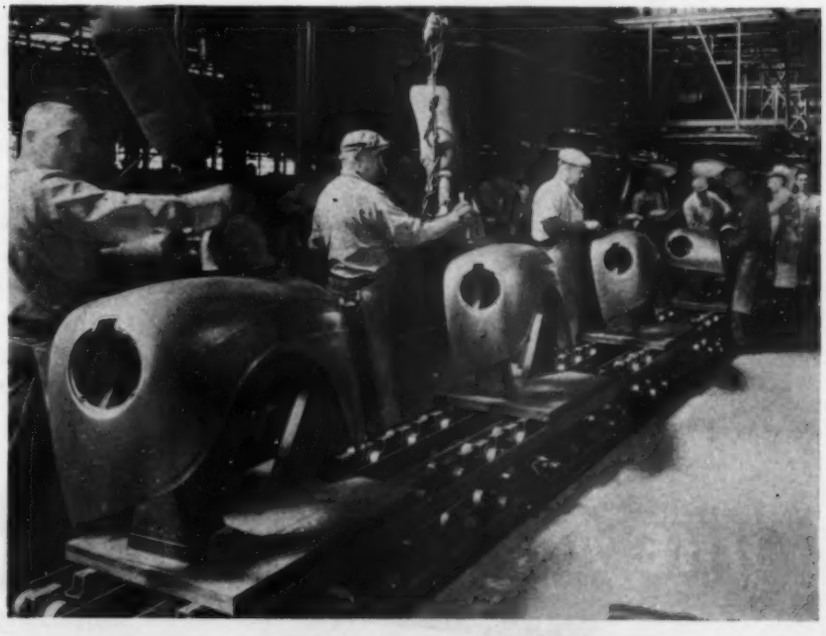
Special pictorial section begins on page 787. It includes machine tools to have been displayed at Cleveland but not represented in our Show-in-Print section. Some of them are just now being put on the market, others were brought out earlier in the year. They may give you some new ideas about how to cut costs or solve a production problem.

New equipment is attracting more attention than in years from domestic buyers now that, as one government official puts it, "the profit motive has been partly restored." That's why it is more important than ever for production executives to keep abreast of the new designs in machine tools. For a review of the latest tools, see page 707.

'40 car models are now coming off the assembly lines in considerable volume, though the New York Show doesn't open until October 15. How does Detroit feel about the outlook, now that war is raging abroad? What production plans do the Big Three have? Our own editor who lives in the heart of the motor world in Michigan gives you the lowdown on page 806e.

COMING

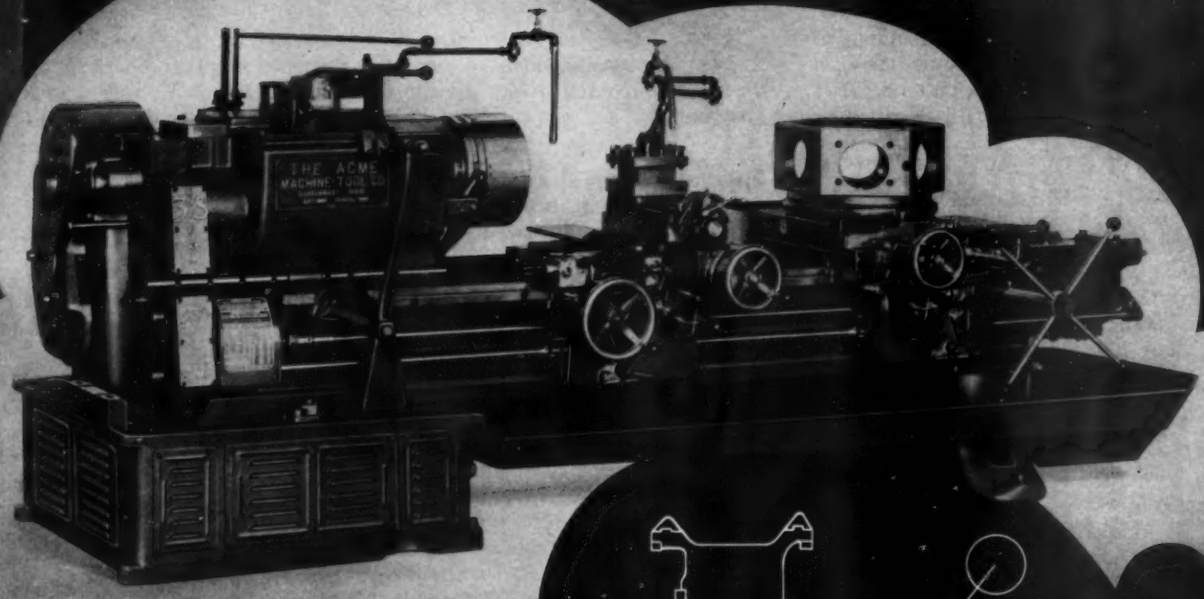
Chrysler has been spending a lot of money in its various car divisions to get ready for the '40 season. Completely new machining lines have been installed at Highland Park. A new process of automatic body welding is employed at the Kercheval plant. Among the improvements at Dodge is complete retooling for the machining of transmission parts. Plymouth has its share of advanced methods, including a better technique of fender polishing. All of these developments, which contribute to more car value by all Chrysler Corporation divisions, will be described, mostly in pictures, in our next issue. Thanks to the fine cooperation of Chrysler production officials at the time of the year when they are the busiest, *American Machinist* is able to give its readers a preview of 1940 automotive production practices.



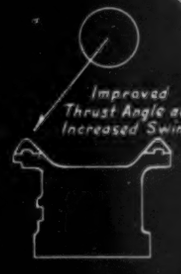
Plymouth uses wood bucks on fender polishing conveyor

NEW

NOW AVAILABLE
No. 3-S CINCINNATI ACME UNIVERSAL TURRET LATHE



Gibbed to Self Guiding Hardened Steel Vees



Improved Thrust Angle and Increased Swing

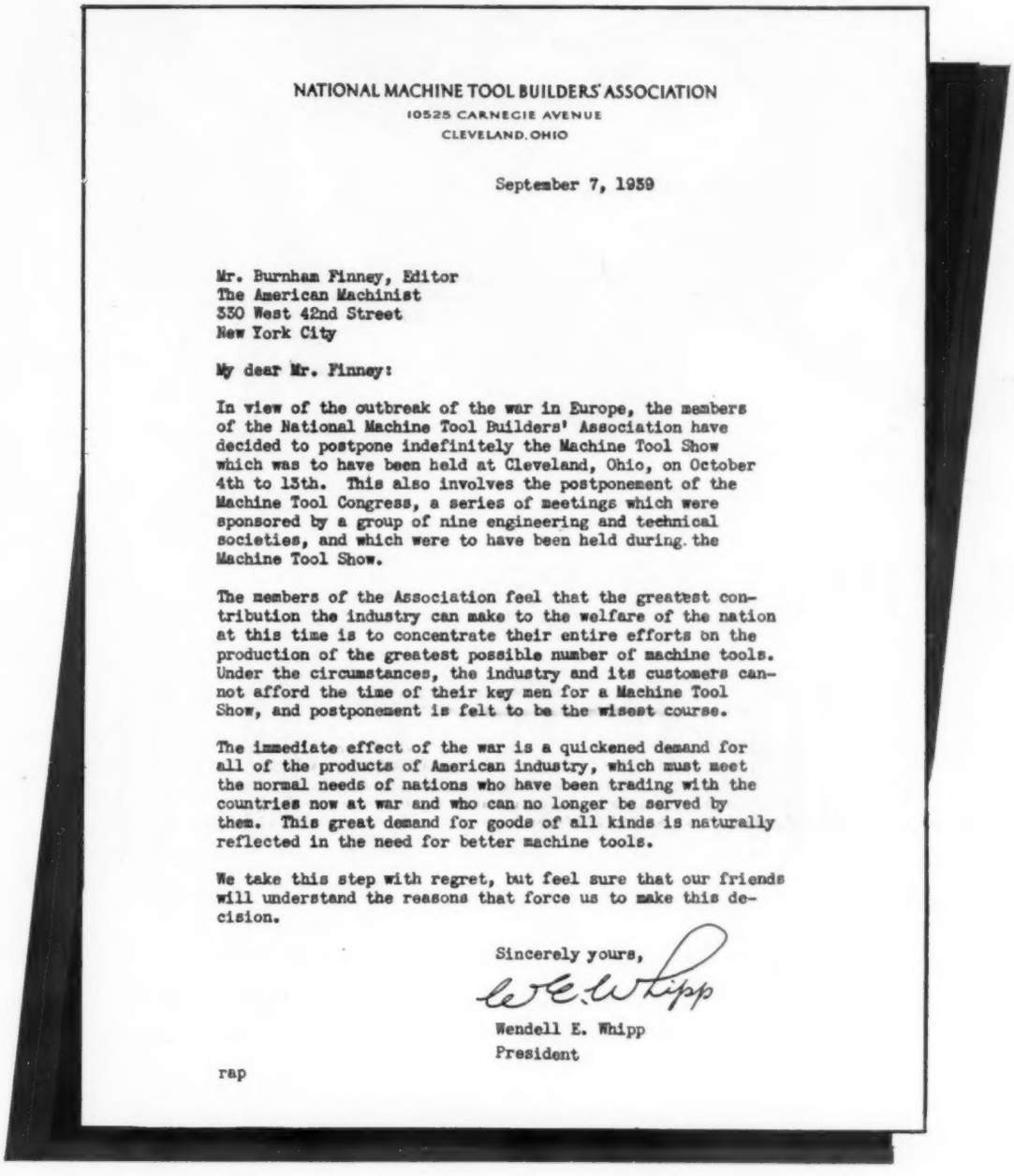
● ALL PROFIT-production officials will find in this new machine a very certain means of increasing capacity and broadening the scope of their operations. Shown here is the new No. 3-S which offers an abundance of power . . . ample speeds and feeds to meet the demands of carbide and other high production cutting tools. In addition to the features highlighted on the right, we would like to call attention to the bridge type universal side carriage, triple roller bearing spindle, and to the fact that No. 3-S is available with fixed center or cross sliding hexagon turret.

One Shot Lubrication

Oil Filter for Headstock

New circular just off the press will be sent you immediately upon request.

THE ACME MACHINE TOOL COMPANY
CINCINNATI · · · OHIO



NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION
10525 CARNEGIE AVENUE
CLEVELAND, OHIO

September 7, 1939

Mr. Burnham Finney, Editor
The American Machinist
330 West 42nd Street
New York City

My dear Mr. Finney:

In view of the outbreak of the war in Europe, the members of the National Machine Tool Builders' Association have decided to postpone indefinitely the Machine Tool Show which was to have been held at Cleveland, Ohio, on October 4th to 13th. This also involves the postponement of the Machine Tool Congress, a series of meetings which were sponsored by a group of nine engineering and technical societies, and which were to have been held during the Machine Tool Show.

The members of the Association feel that the greatest contribution the industry can make to the welfare of the nation at this time is to concentrate their entire efforts on the production of the greatest possible number of machine tools. Under the circumstances, the industry and its customers cannot afford the time of their key men for a Machine Tool Show, and postponement is felt to be the wisest course.

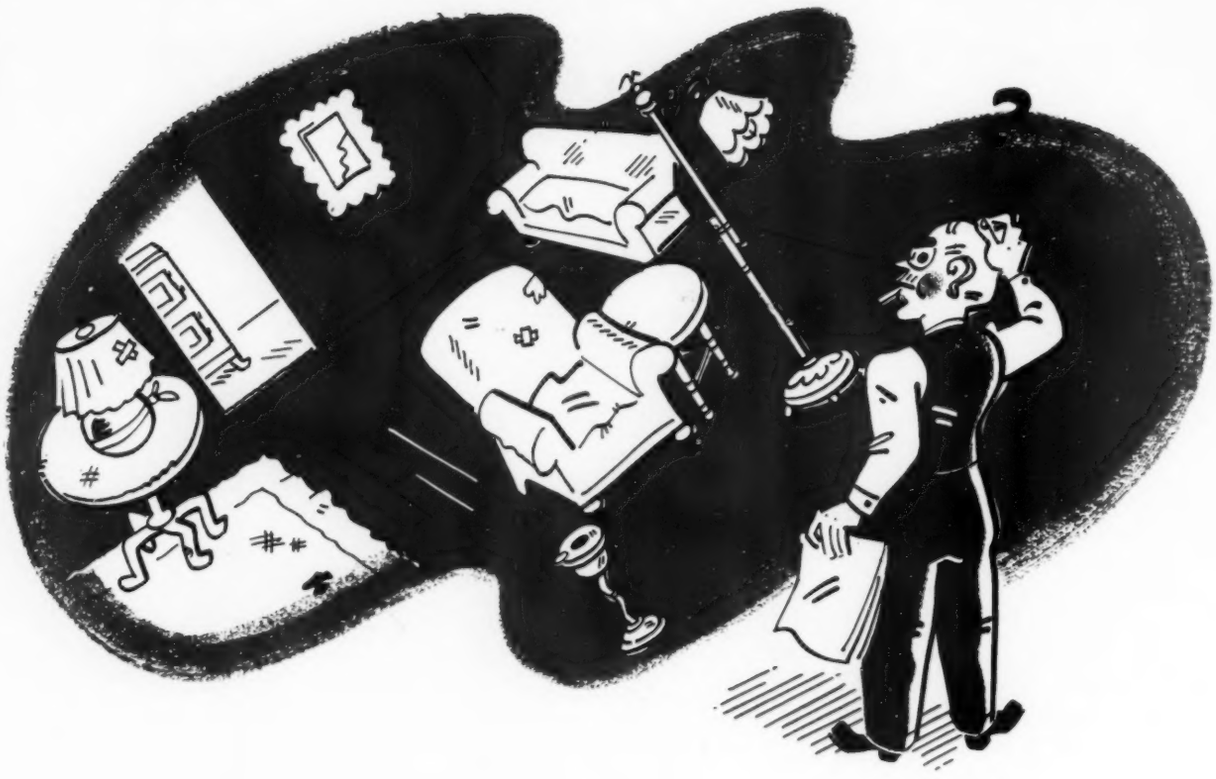
The immediate effect of the war is a quickened demand for all of the products of American industry, which must meet the normal needs of nations who have been trading with the countries now at war and who can no longer be served by them. This great demand for goods of all kinds is naturally reflected in the need for better machine tools.

We take this step with regret, but feel sure that our friends will understand the reasons that force us to make this decision.

Sincerely yours,
W. E. Whipp
Wendell E. Whipp
President

rap

IN VIEW OF THE DECISION of the National Machine Tool Builders' Association to postpone indefinitely its show, as explained in the above letter, *American Machinist* presents on the following pages the Show-in-Print. We give our readers a word picture of what they would have seen had the show been held as scheduled. At a time when new demands are likely to be made on the metal-working industry as a result of war conditions, it is particularly appropriate to call attention of management and of production executives to the new equipment herewith described. Its use will help American industry to achieve top efficiency.



IT'S SMART TO BE MODERN

Industry has never recovered the ground lost during the depression years when equipment aged more rapidly than it was replaced. What is it waiting for?

By JOHN HAYDOCK
Managing Editor, American Machinist

JOHN Q. MACHINERY is in a bad way. He furnished his house back in the good old days before the stock market break in 1929 and the business depression that ensued. When his income was good, he kept things looking pretty well, systematically spending something every year on repairs and replacement.

But MacHinery's income depended on how much he sold. When business slumped, he decided to make his old furnishings do. After a while, the springs went through the bottom of the sofa and the upholstery became frayed. Holes wore through the rugs, the chair legs became shaky and the house took on a seedy appearance in general.

In fact everything he had became outmoded. His old refrigerator was expensive to operate, his automobile needed frequent repairs and his lighting fixtures did not conform to modern ideas of good illumination. MacHinery said he simply didn't have the money to spend on furniture.

Then things began to pick up. Sales increased, and MacHinery's income rose. He replaced some of the most noticeable casualties and repaired others; but he did no more than keep pace with current wear and tear. He excused this by saying that he had to pay his help more and his taxes had doubled.

One thing that troubled him was the fact that his

friends and neighbors noticed the rundown condition of his house. Judging by its appearance, MacHinery's house did not look as though it belonged to an up-and-coming business man. It actually hurt his standing in the community and proved a business handicap. While he realized this, he still couldn't make up his mind to spend the money to bring his house up-to-date.

THE METAL-WORKING INDUSTRY today is in the same fix as John Q. MacHinery. Back in 1930, according to a survey made by AMERICAN MACHINIST, 48 per cent of U. S. machine tool equipment was over ten years of age. Then the depression set in. Replacement programs were scrapped, hand-to-mouth buying became the vogue and physical investment ran down hill. Like MacHinery, most concerns lived on capital in the form of plant investment made during better times.

Another survey, made in 1935, clearly showed this condition. Old equipment in place jumped from 48 to 65 per cent; machines had aged much faster than they had been replaced. The policy of retrenchment was excused by the fact that business was in critical shape.

Eventually stagnation disappeared. The pace of commerce accelerated, until in the latter half of 1936 and the first half of 1937, activity in many lines reached pre-depression levels. In 1937, the index of machine tool orders reached 186.9, well above the 1929 level of 155.8. But this activity was not maintained long enough to make much of a dent in seven years of deferred equipment replacement.

An estimate, made as of July 1, 1937 (*AM*—Vol. 81, page 964), showed that equipment over ten years old had receded only from 65 to 61 per cent. A similar estimate, made as of July 1, 1939, now puts this figure at 62 per cent, which means that during the past two years industry has made no progress in modernization; in fact it has slipped backward a little.

This conclusion may seem at variance with the current comparatively high level of machine tool activity. For the first half of 1939 the index of orders was maintained at an average of 181.7, close to the 1937 level. The answer is that an abnormally high portion of domestic machine tool production is being shipped abroad instead of going into the modernization of plants in this country.

For the first half of 1938, the last six-month period for which the machine tool index was broken down into domestic and foreign orders, overseas sales were 51.5 per cent of the total as compared to a normal level around 20 per cent. It is safe to assume that this level of foreign orders has not decreased; so less than half of current machine tool output goes to improve American plants where ordinarily 80 per cent would be so directed.

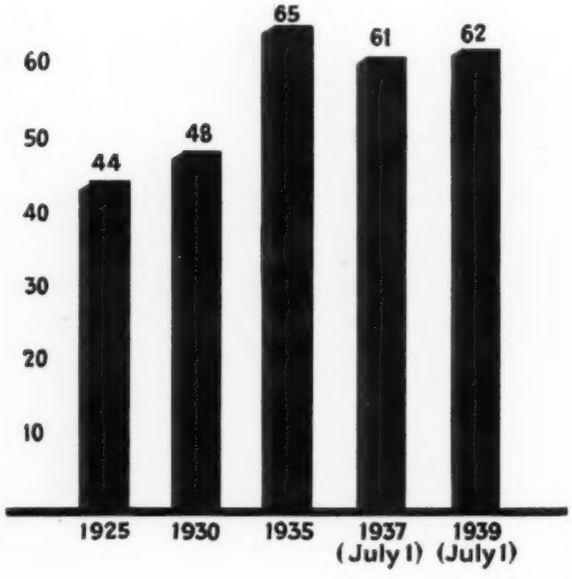
ALL OF WHICH GIVES RISE to some serious consideration. For one thing preparedness depends not only upon men and munitions of war but also upon the physical condition of industrial plants throughout the country. Upon the metal-working industry will fall by far the greater share of the task of supplying the materials and equipment for national defense. The government's rearmament program recognized the importance of adequate manufacturing facilities by ap-

propriating $6,000,000 for the modernization of the army arsenals alone.

But aside from any military consideration there are sound business reasons for restoring, at least to pre-depression levels, our plant efficiency. Equipment design and performance has progressed vigorously during the past ten years. An examination of the "Show in Print" pages will convince the most confirmed skeptic. Common business sense demands that on a profit-making basis alone these new machines be put to work in American industry.

For those interested in the method of arriving at the present estimate of equipment over ten years of age a brief explanation is in order. AMERICAN MACHINIST's last Inventory of Metal-Working Equipment gave the total machine tools in place as of January 1, 1935, and those over ten years of age. Since that date and until July 1, 1939, a number of machine tools were installed in this country. An estimate of the number was made from the Census of Manufactures' totals for 1935 and 1937. For 1936 and 1938, when no census was reported, and for the first half of 1939, the census figures were prorated in accordance with the tool index of orders compiled by the National Machine Tool Builders' Association. The proper allowance was made for foreign sales.

During this period certain branches of the industry, notably aircraft and shipbuilding, expanded. Other branches used the new units largely for replacement of old machines. In allotting the new equipment installed, 25 per cent was considered as going into new plants or increasing the capacity of older ones, while 75 per cent was assumed as purchased for replacement.



WHILE THIS EQUIPMENT was added as new, some of the equipment reported as under ten years old in 1935 passed beyond the arbitrary age limit. Specifically, all equipment installed between January 1, 1925, and July 1, 1929, went over the dividing line. An estimate of the number of these machines was made by the method outlined above. Census figures for 1925, 1927 and 1929 were modified by the machine tool index to approximate the intervening years. The total, less foreign sales, was deducted from the new machines in place while that estimated for the past four and a half years was added. The result gives a good approximation of new machines in place today. From this figure the percentage of old equipment is readily calculated.

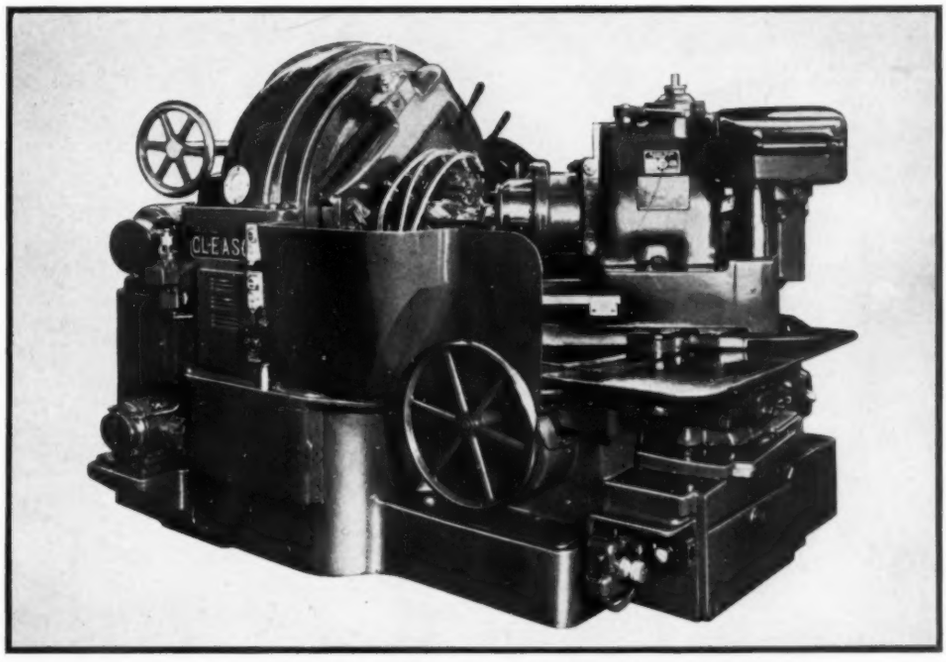
The fact that we are not gaining ground is thought-provoking to say the least. Is industry, like John Q. MacHinery, so accustomed to seedy surroundings that it has lost its zest to keep its manufacturing house in order? Does it fail to recognize that higher wages and taxes make cost control even more imperative than ever? It would seem inevitable that the physical need for better manufacturing facilities must make itself felt despite all other considerations.

Method of Computing Percentage of Old Equipment as of July 1, 1939

1. Total units in place—*AM* 1935 Inventory	1,341,942
2. Units over 10 years old—*AM* 1935 Inventory	830,247
3. Units less than 10 years old (1—2)	511,695
4. Installed January 1, 1935—July 1, 1939	225,500
5. Installed January 1, 1925—July 1, 1939 (3+4)	737,195
6. Installed January 1, 1925—July 1, 1929	202,100
7. Less than 10 years old, July 1, 1939 (5—6)	535,095
8. Total units in place, July 1, 1939	1,392,462
9. Units over 10 years old July 1, 1939 (8—7)	857,367
10. Percentage of equipment over 10 years old	62

Notes: 1 and 2—Adjusted to conform to Census of Manufacturers classification. 4—Estimated from 1935 and 1937 Census figures and N.M.T.B.A. index of orders. 6—Estimated from 1925, 1927 and 1929 Census figures and N.M.T.B.A. index of orders. 8—From Item 1 plus 25 per cent of Item 4.

MACHINE TOOL SHOW IN PRINT



Generated tooth profiles on bevel and hypoid gears and pinions can be ground on the No. 15 Gleason grinder

Gleason Grinder Finishes Curved-Tooth Bevel Gears

Hardened, curved-tooth, bevel and hypoid gears, such as are used in aircraft work, can be precision ground in the No. 15 gear and pinion grinder developed by Gleason Works, 1000 University Ave., Rochester, N. Y. This machine will grind "Zerol" bevel, spiral bevel and hypoid gears and pinions. Generated tooth profiles are ground by means of a relative rolling motion between the wheel and the work. This motion consists of rotation of the cradle on which the wheel is mounted and rotation of the work on its axis. The relative motion is the same as though the gear being ground were rolling with a generating gear.

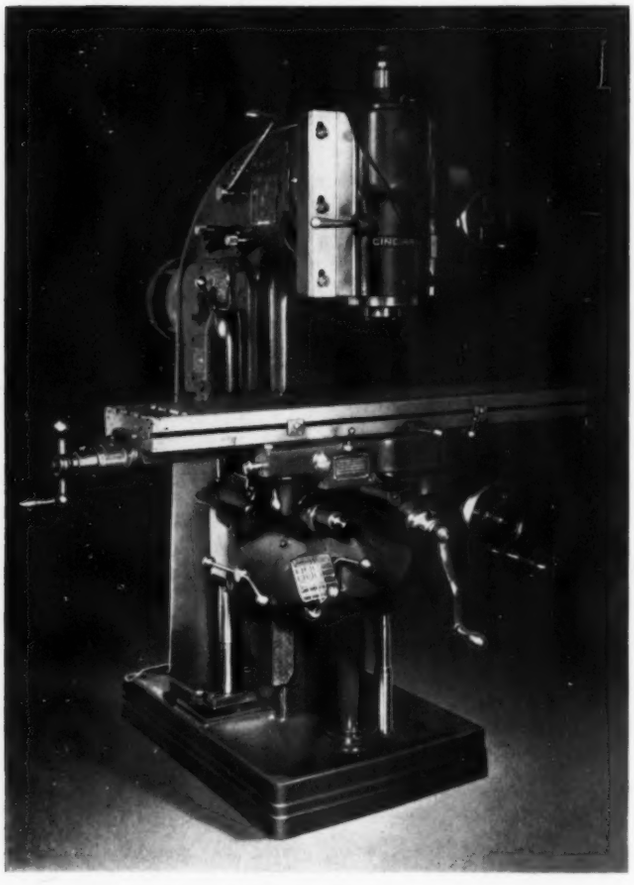
After the work is chucked and the wheel dressed, operation of the No. 15 grinder is entirely automatic. The gear is fed into the wheel, the tooth ground by rolling with the wheel, and the gear withdrawn for indexing. This sequence of operations is repeated for each tooth and the machine stops automatically after the last tooth has been ground. Specifications: maximum cone distance, 9 in. with a 30-deg. spiral angle and 6 in. with a 0-deg. spiral angle; coarsest diametral pitch, $2\frac{1}{2}$ with 30-deg. spiral angle, 3 with 0-deg. spiral angle; maximum full depth of tooth, $\frac{3}{4}$ in.; floor space required, 71 x 104 in.

The

Cincinnati Vertical Millers Combine Simple Design With Facilities for Rapid Production

Designed to meet the demand for a simple milling machine combining sensitivity with rigidity, the No. 2-L vertical milling machine announced by Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati, Ohio, are easy to set up and operate. Especially adaptable for miscellaneous milling operations from small to medium size work, these machines have a moderate height table, a sliding head with a head travel of 4 in., and hand feed movement. The machines are supplied with or without swivel to the sliding head. The swiveling of the head in degrees permits the setting of the spindle in a vertical plane at any angle, either side of O, from vertical to horizontal. This feature makes it possible to mill surfaces, drill and bore holes at any variety of angles without the use of special fixtures and attachments, and in many cases without relocating the work in the holding vise or fixture.

Powered by a flange-mounted 3-hp. motor, the No. 2-L machine has a working surface on the table measuring 49¼x10⅛ in. Longitudinal range is 28 in. Vertical adjustments are made through the knee as well as through the sliding head, enabling the operator to bring the cutters and work to the most convenient elevation. Twelve spindle speeds, ranging from 67 to 1520 r.p.m., and power rapid traverse in six directions are standard features of these machines. Twelve power feeds for longitudinal, cross and vertical travel of the table, saddle and knee are provided. Longitudinal range of the table is from ¾ to 30 in. per min.; the twelve cross-feeds of the table and saddle range from ½ to 20 in. per min. and power feed of the knee is from ¼ to 10 in. per min. A single lever located at the front right-hand side of the knee gives 100 in. per min. power rapid traverse for the table, and 66 in. and 33 in. per min. for the saddle and knee, respectively.



Both the table and the head of the L-type vertical millers announced by Cincinnati can be adjusted vertically to suit the job

Hand feed movement to the vertical head is through a worm and worm-wheel combination. One turn of the hand wheel moves the vertical head 0.050 in. An adjustable stop is supplied for accurately setting the head. As an extra attachment, a four-position turret stop with dial indicator for accurate step-milling operations can be provided. Control of the machine is simplified and the operator standing at his normal operating position directly in front of the machine can engage all power and hand adjustment without moving from his position.

The No. 0-8 vertical miller also announced by this company is recommended particularly for either rapid production or job lot production of small parts for firearms, sewing machines, refrigerators, cash registers, business machines and similar units. Equipped with both hand and power table movement and with adjustable vertical spindle, this machine is powered with a 1-hp. motor for the spindle drive and a ¼-hp. motor for the table drive. The miller is mounted on a cabinet base, providing convenient working heights for the operator. It is of fixed-bed construction, with the bed and columns cast of Meehanite in one piece. All rotating shafts of the table drive and vertical spindle-head mechanism are mounted on anti-friction bearings.

Eight spindle speeds ranging from 150 to 1300 r.p.m. are available and are selected with interchangeable four-step pulleys on the spindle drive shaft and on the motor drive shaft. The vertical spindle is driven by an independent constant-speed motor mounted at the rear of the vertical spindle head. A 4-in. vertical adjustment of the head is accomplished by a hand lever which actuates a gear meshing with a rack integral with the quill. A hand lever on the left-hand side of the vertical head provides a positive clamp of the quill in any position. Built into the

vertical head is a stop arrangement for accurate step milling.

Two series of eight table feeds are available. The low series ranges from ½ to 5⅛ in. per min. and the high series from 1 to 10¼ in. per min. Feed changes are made with pick-off gears at the front of the machine bed. Power rapid traverse is 100 in. per min. and is constant regardless of the feed selected. It is engaged by hand levers located on the right-hand side of the machine bed. Complete automatic lubrication is a feature of these machines. A built-in cutter coolant pump can be mounted on the inside of the bed and driven from the table feed power shaft. An automatic backlash eliminator, which must be built in at the factory, can be supplied as an extra. When equipped with the standard cabinet base, the machine weighs approximately 1,450 lb. It occupies an area of approximately 13.9 sq. ft.

The Cincinnati No. 0-8 vertical miller is suited for a wide range of milling operations on small parts. The spindle is mounted on anti-friction bearings

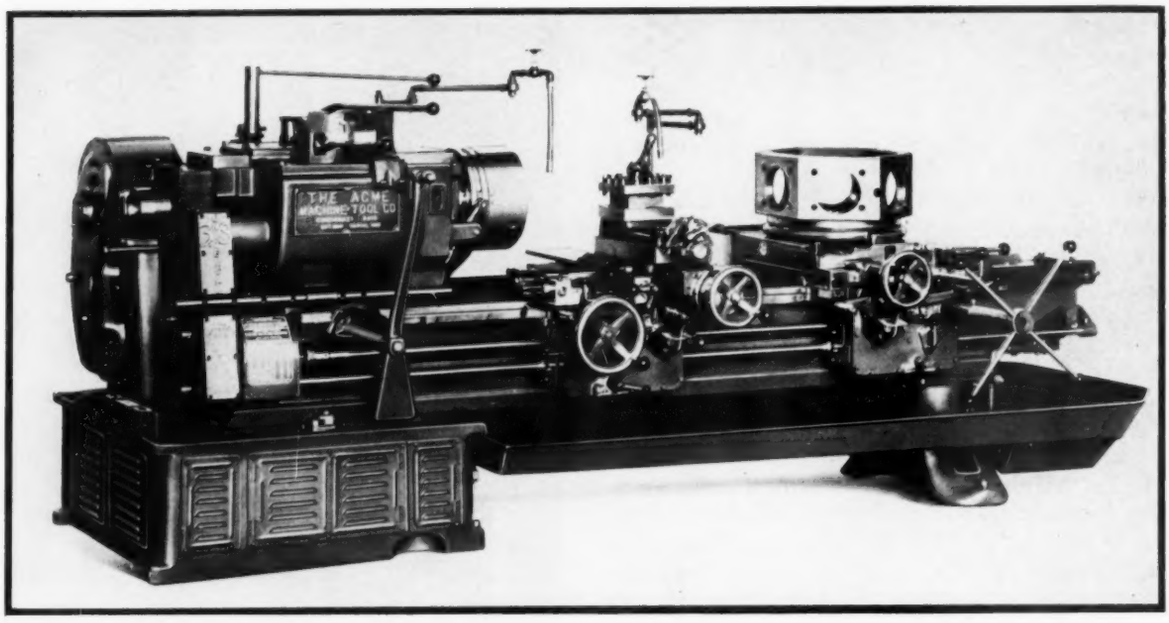
Acme No. 3S Universal Turret Lathe Swings 26 1-2 in. Over Bed

Featuring greater distance between ways, non-overhanging headstock construction, motor in base and a new feed selector, the No. 3S universal turret lathe developed by the Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, Ohio, has hardened and ground one-piece steel ways mounted on the bed. The headstock has been further improved by the addition of an automatic spindle brake and filtered oil lubrication. Both carriages are taper gibbed to the self-guiding steel ways. An additional taper gib is provided for the side carriage along the lower front of the bed. One-shot lubrication to each carriage is provided by means of a pump which forces oil to the bedways and other moving carriage parts. Spindle is mounted in roller bearings and has a flanged nose.

Either fixed center or cross sliding hexagon turrets can be provided. Each of these revolves on tapered roller bearings and has a large double-tapered circumference binder. Anti-friction bearing aprons are provided for both the side carriage and the main turret. The side carriage is of the bridge type, adjustable twin nuts are used for the cross feed screw in order to compensate for wear and eliminate backlash. Twelve independent feed changes are provided in each apron through sliding gears. Positive saw tooth clutches are used.

This heavy-duty turret lathe swings 26½ in. over the bed and 24½ in. over the carriage wings. Swing over cross slide is 18½ in. Bar capacity ranges from 3¼ in. for square stock to 4½ in. diameter for round stock. Hole through spindle measures 4¾ in. Carriage has a cross travel of 14 in. and a longitudinal travel of 56 in. Longitudinal travel of the turret is 57 in. and cross travel is 9 in. for the cross sliding turret. Maximum distance from the turret face to the spindle nose is 65 in. Spindle speed range on the standard machine is 8 to 266 r.p.m. both forward and reverse. If desired, the speed range can be set at 12 to 400 r.p.m. forward and 8 to 266 r.p.m. reverse. For ordinary duty, a 10 hp. motor is used. This is increased to 15 hp. for heavy-duty operations.

A smaller No. 1S machine, having similar features also is being introduced. This machine has capacity for 2½ in. diameter bar stock and a longitudinal turret travel of 41 in. This machine will take a 12-in.



A safety latch is provided on the No. 3S Acme turret lathe to prevent accidental starting

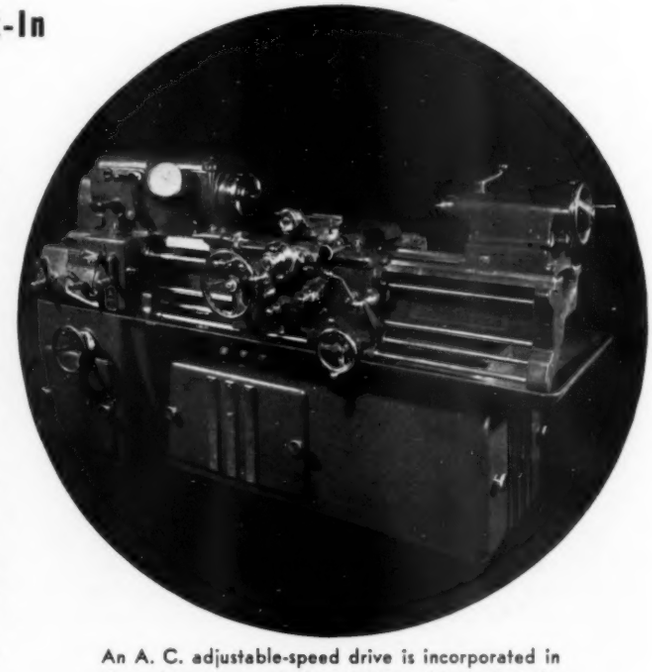
chuck, while the No. 3S machine will take an 18 in. diameter chuck. The No. 3S lathe can be equipped with a "Hydro" electric duplicator for contour boring and turning.

The No. 5R ram-type universal turret lathe incorporates an electrically operated speed selector which affords pre-selection of spindle speeds and change of speed instantly. Headstock of this lathe is of the non-overhanging type with the motor in the cabinet leg, as for the No. 3S machine. The bed also is equipped with hardened and ground one-piece steel ways. Hexagon turret of this lathe is indexed automatically and clamped. The ram slide is surrounded in hardened steel bearing plates and gibs to minimize wear and maintain alignment. Turret apron provides nine independent forward feeds.

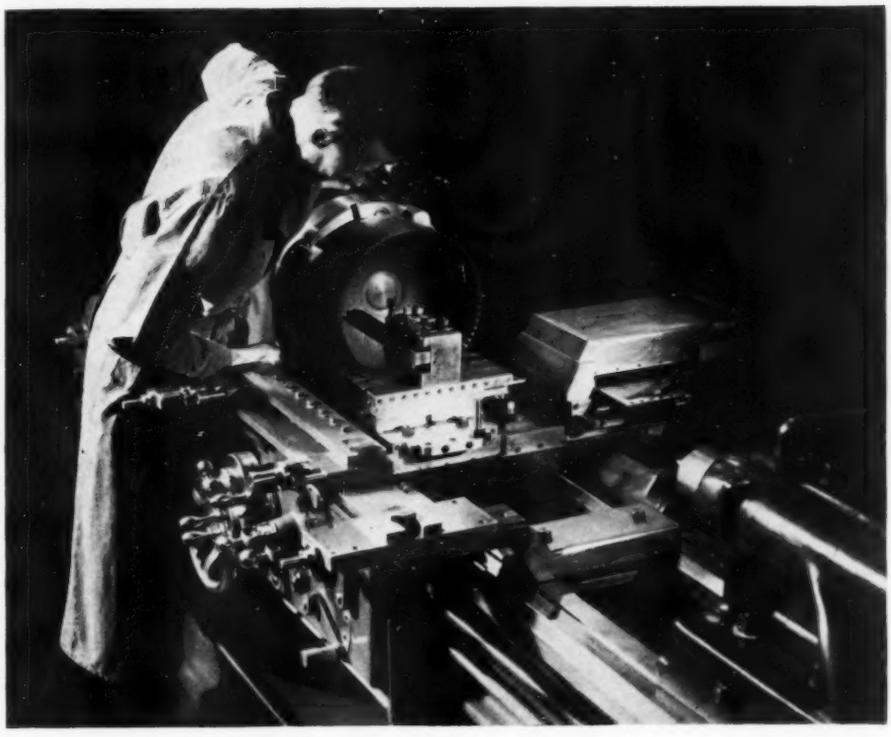
Monarch 12x30 in. Lathe Has Built-In A. C. Adjustable-Speed Drive

The Monarch Machine Tool Co., Sidney, Ohio, has announced a 12x30 in. lathe powered with an all-electric a.c. adjustable-speed drive which employs a principle of speed control heretofore confined to larger drives. The 100-to-1 spindle speed power unit is entirely self-contained, being mounted inside the cabinet base. Drive from this unit to the spindle is by flat belt. Two ranges of spindle speeds from 15 to 1500 r.p.m. are provided by means of a back-gear unit on the spindle. This range may be varied to suit requirements.

Also offered is a Monarch-Keller controlled lathe equipped with a Kelley shape turning device. With this device, dies and molds and similar work can be turned, bored or faced to any irregular contour or any shape within the limits of the turning, boring or facing cutter used. Operation is simple. A thin metal templet is used for the Keller control unit to secure the desired contour, and a circular "record" is



An A. C. adjustable-speed drive is incorporated in the cabinet base of this 12x30 in. Monarch lathe



With a Kelley shape-turning device mounted on an 18x48 in. Monarch-Keller lathe, dies and molds can be turned, bored or faced to any irregular contour within the limits of the cutter used

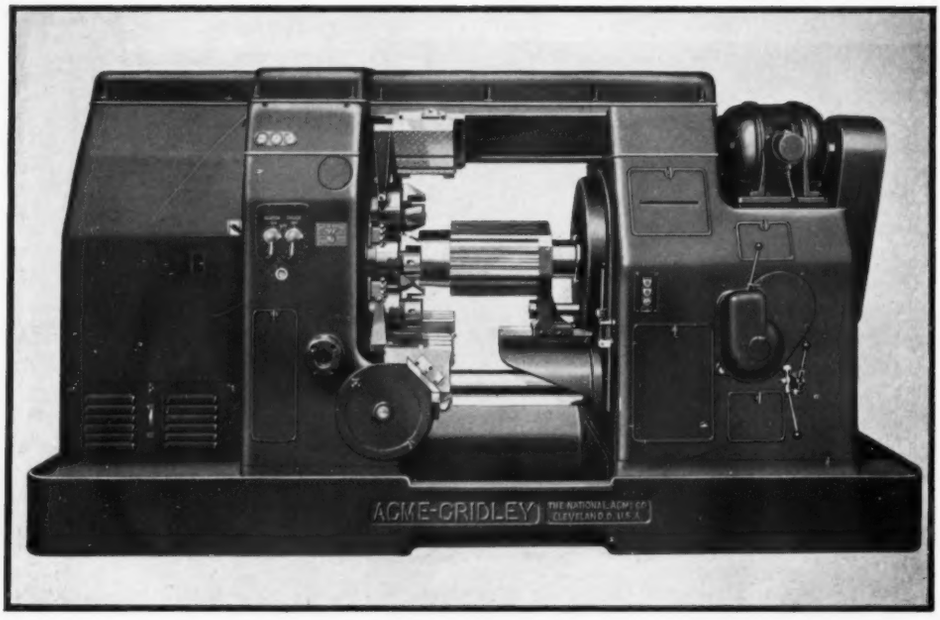
used for the Kelley controls to secure the desired circular shape. Only a few minutes are required to mill the master "record" and this is done on the lathe itself.

As many as 500 or more tool actuations may be imparted to the work at one revolution of the lathe spindle. The same shape may be maintained on the work piece, even though the diameter of the cut is constantly changing. This device is available on 18x48 in. lathes.

Applicable to all sizes of Monarch lathes, the lead screw variator is simple in operation. The work screw is rough chased in the regular way, a few thousandths being left for finishing. An accuracy reading then is made with the work in the lathe, by means of a visual gage that measures errors to 0.00001 in. and the lead error in each inch or other increment of the semi-finished work screw is recorded. This error is removed in the finish chasing operation by manually moving the lathe lead screw laterally by means of the variator.

A 12-in hydraulically operated lathe which automatically will maintain any desired surface cutting speed within the diameter range of the machine also has been developed. This lathe is equipped with a 100-to-1 spindle speed power unit mounted inside the cabinet base. This unit can be either automatically or manually controlled. Drive from the infinitely variable power unit to the spindle is through multiple V-belts. There are no gears on the spindle of the lathe except the feed drive gears. When the operator desires to select any required spindle speeds manually, it is done with a lever on the apron.

Lead errors in screws being finish-chased can be removed with the lead screw variator attachment



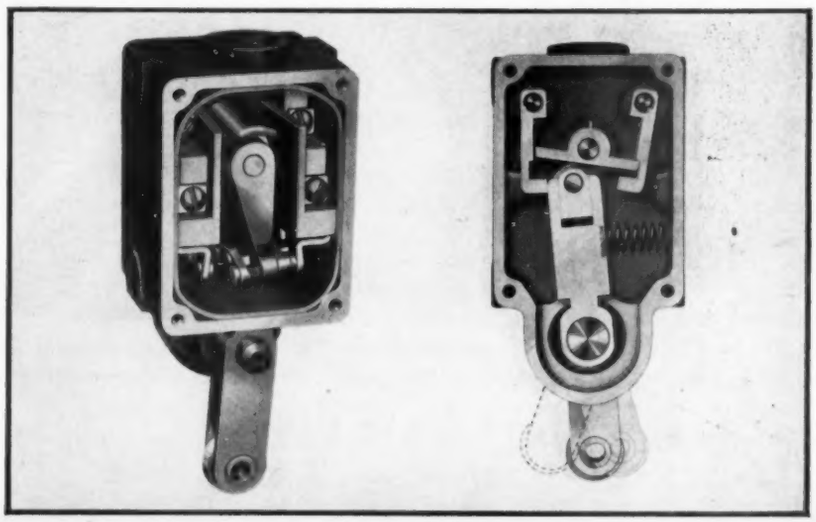
The Acme-Gridley six-spindle chucker has mechanically operated feeds and speeds

Full Hydraulic Chuck Operation Applied to Acme-Gridley Six-Spindle Chucking Machine

The Acme-Gridley 12-in. Model RPA six-spindle chucking machine, made by the National Acme Co., Cleveland, Ohio, has mechanically operated feeds and speeds, and features full hydraulic chuck operation. It is equipped with high precision adjustable anti-friction bearings, and has full splash lubrication. Maximum swing of this machine is 12 in. and it has a maximum turning length of 12 in. Spindle speeds range from 23 to 202 r.p.m. when the pulley shaft is driven at 500 r.p.m. A 40-hp. drive motor is required. Maximum standard cam size is 8 and 12 in. for the tool slide and 2 and 4 in. for the upper and lower cross slides. The machine requires a floor space measuring 15 ft. long and 6 ft. wide, and is almost 8 ft. high. Net weight, arranged for motor drive but without motor and tools, is 58,000 lb.

Another development featured by National Acme Co. is the "snap-lock" limit switch designed to hold up mechanically and electrically and under the requirements of machine tool applications. It is suitable for all normal circuits such as applied to machine limit switches, conveyor lines, and to safety, counting and signal switches. It can be mounted at any angle and is oil and dust proof. All operating parts are made of hardened steel.

It can be arranged for either normally open or normally closed applications and is arranged for two double-break circuits. Separate enclosures are provided for the electrical contacts and operating mechanism. Snap make-and-break of contacts is arranged with positive locking in either position. It operates on light pressure, at 10-deg. travel, with additional over-travel of 29 deg. The operating lever can be adjusted to a fixed position 80 deg. either way from normal.



The "Snap-Lock" switch features separate inclosures for electrical contacts and operating mechanism

SHOW IN PRINT

Rivett Lathe and Grinder Presents Precision Lathes For Small Work

Designed for toolroom, laboratory and production shop operations, the No. 1020 precision back-geared screw cutting lathe offered by Rivett Lathe & Grinder, Inc., 20 Riverview Road, Brighton, Boston, Mass., has a ball-bearing mounted spindle, quick-change gears, a heavy box-section bed with three-point mounting and separate ways for carriage, carriage saddle and tailstock. This lathe is mounted on a steel cabinet which has an inclosed unit motor drive, and two drawers for collets and attachments. All moving parts of the lathe and drive are dynamically balanced to minimize vibration.

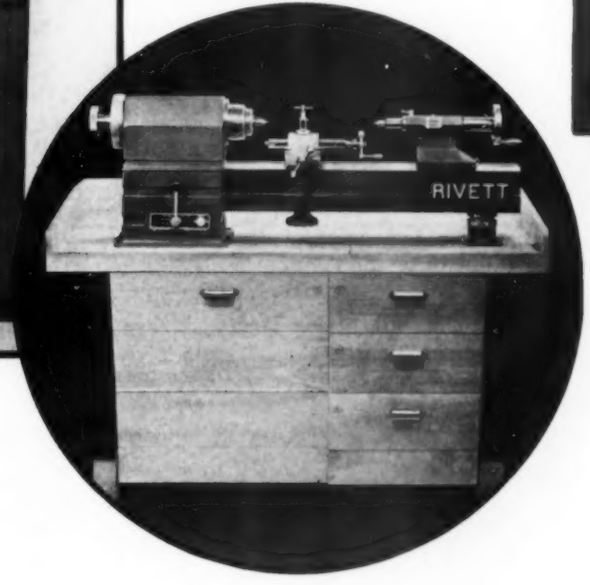
Draw-in collets up to 1 in. capacity can be used in the spindle. The spindle is driven by two V-belts which can be replaced without disturbing any part of the drive. Spindle is graduated for cutting double, tripe and sextuple threads; has a large aluminum hand wheel for turning by hand when setting up, measuring or indexing work; and has infinite speeds from 20 to 500 r.p.m. when back geared and from 100 to 2500 r.p.m. with open belt drive.

The carriage is provided with a full length bearing on the rear and front surfaces of the bed and is fitted with adjustable gibs to compensate for wear. There are suitable wipers and oilers in contact with each bearing surface. The carriage is equipped with both power and hand longitudinal feeds. For thread cutting a $\frac{7}{8}$ in. diameter Acme leadscrew controls the carriage through a split bronze nut operated by a lever on the front of the carriage. An interlock prevents engaging the feed rod and lead screw at the same time. A stop rod, with adjustable micrometer stops, automatically controls the travel of the carriage in either direction. A compound-slide rest mounts on the saddle of the carriage. This rest consists of a cross-slide, a swiveling intermediate base and a tool-post slide. The cross-slide swivels 360 deg. Power cross-feed is engaged by a lever mounted on the front of the carriage.

The lathe is equipped with quick-change gearing mounted integral with the machine to provide 54 changes of threads from 7 to 156 per inch, including $11\frac{1}{2}$ and 27 threads. A taper attachment mounts at the rear of the bed and provides for a maximum taper of 10 deg. to each side and a length of taper of 12 in.

Specifications: Swing over bed, $10\frac{1}{4}$ in. diameter; diameter of round stock that can be passed through spindle, $1\frac{1}{4}$ in.; length of bed, 39 in. distance between centers with tailstock flush, 20 in.; swing over tool

All moving parts of the No. 1020 screw cutting lathe offered by Rivett are dynamically balanced to minimize vibration



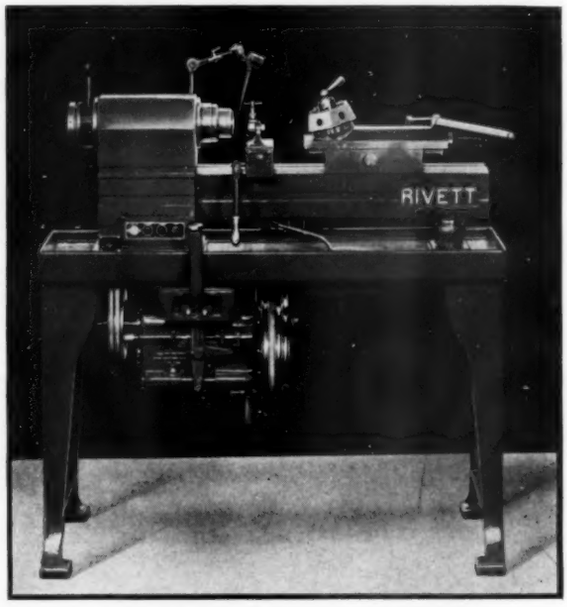
Spindle speeds of 100 to 3,750 r.p.m. can be obtained on the standard No. 918 plain precision bench lathe

slide, 2¼ in.; swing over compound swivel, 3⅝ in.; swing over cross-slide, 6 in.; swing over carriage saddle, 7¾ in.; travel of tailstock spindle, 3½ in.; adjustment of tailstock set-over 5/16 in.; range of feeds, 0.001 to 0.028 in.; range of spindle speeds, 20–25 r.p.m.; travel of tool post slide, 4¼ in.; travel of cross-slide, 6 in.; floor space required, 53x26 in.; net weight of lathe, mounting and drive, approximately 1100 lb.

The No. 918 precision bench lathe has a 9 in. swing and will take draw-in, or push-out collets with capacity up to 1 in. It is of heavy construction and is mounted to eliminate vibration at high spindle speeds. Electrical control to the driving unit provides spindle speeds ranging from 100 to 3,750 r.p.m. The bed is 39½ in. long and the distance between centers with tailstock flush is 18 in.

Designed for manufacturing small duplicate parts requiring up to eight successive operations at one chucking, the No. 918 hand screw machine incorporates many of the features of the plain No. 918 bench lathe in the same series. The work may be done on bar stock passed through the spindle and held in push-out collets, or on pieces individually chucked. An automatic spot-feed attachment controlled by a separate lever or foot treadle can be mounted to feed bar stock through the spindle. The machine may be mounted on an oil pan or cabinet.

The preloaded ball-bearing spindle of this screw machine can be operated at any speed from 100 to 3,750 r.p.m. Complete electrical control provides full starting or stopping time of the spindle within one second. Swing over the bed is 9 in. and collets will hold work up to 1 in. diameter. The tilted-head turret is mounted on Timken Bearings with each of the six stations geared directly to adjustable stops. The turret can be released for selective hand indexing forward or reverse. Swing over the cross-slide is 3½ in. and maximum distance from the spindle mouth to the turret head is 13 in. All rotating parts of the screw machine and drive are dynamically balanced.

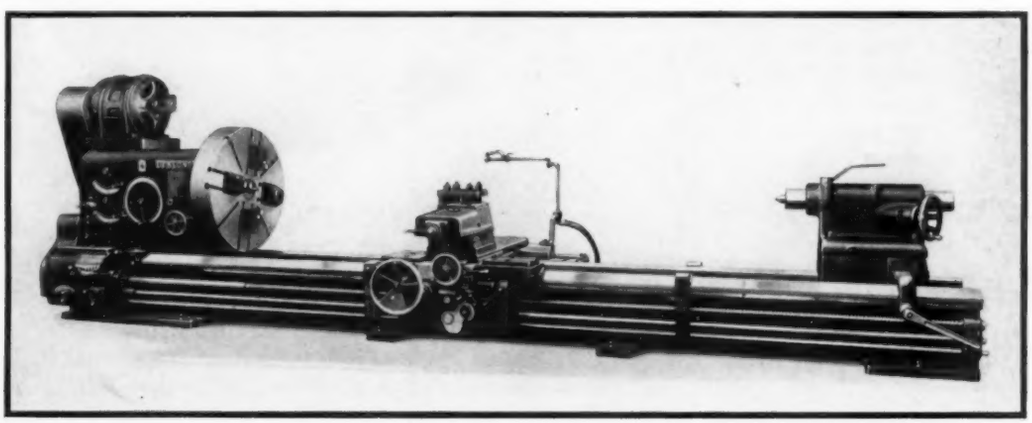


Tilted-head turret on this No. 918 screw machine has adjustable stops for each of the six stations

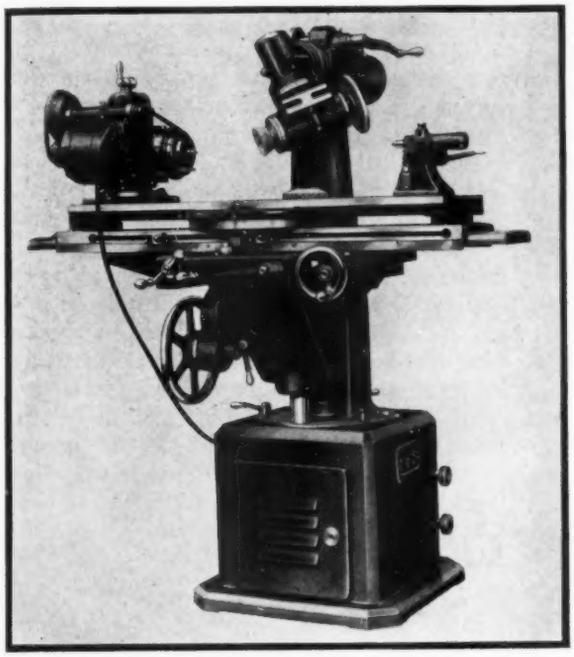
LeBlond "Big Swing" Lathe Provides 54 Feed Changes

The 48-in. "Big Swing" heavy-duty lathe offered by The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, provides 54 selective feed changes without changing gears. The quick change box is sealed in an oil-tight casting. Tailstock spindle, as well as the headstock spindle, is hollow bored, allowing bar stock to be passed freely through both the headstock and the tailstock.

Tapers ranging from 0 to 6 in. can be cut with the geared taper attachment, which permits a maximum



The geared taper attachment on this 48-in. "Big Swing" lathe can be used for length of 25 ft. at one setting



turning length of 25 ft. at one setting. This attachment can be arranged for combined cross-length feed in the apron for wide angles. The carriage is rapid traversed to and from working positions at the rate of 20 ft. per min. A coolant system is available for mounting on this lathe.

Completely redesigned, the No. 3 cutter grinder has increased flexibility. This machine incorporates a universal table which permits setting the work in almost any position or angle with relation to the grinding wheel. The universal wheelhead has three independent and coordinated plates of full circle movement. Workhead is independently motored and incorporates a two-speed driving unit. Attachments are available for all types of tool and cutter grinding.

Universal wheelhead on this cutter grinder has three independent planes of full circle movement

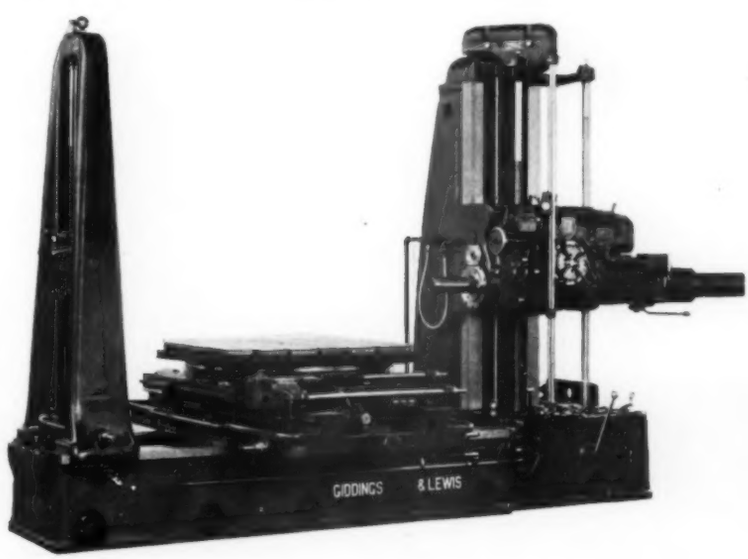
G. & L. Boring, Drilling and Milling Machine Has Built-In Power Revolving Table

The Series 30 No. 340-RT precision horizontal boring, drilling and milling machine offered by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., incorporated a built-in power revolving table. This machine incorporates all of the features of the standard Series 30 table type machines, the revolving table feature being added to permit turning a job to any position within the full 360 deg. rotation of the table. This eliminates the need for mounting and dismounting an auxiliary revolving table when a job must be machined on different sides in one set-up.

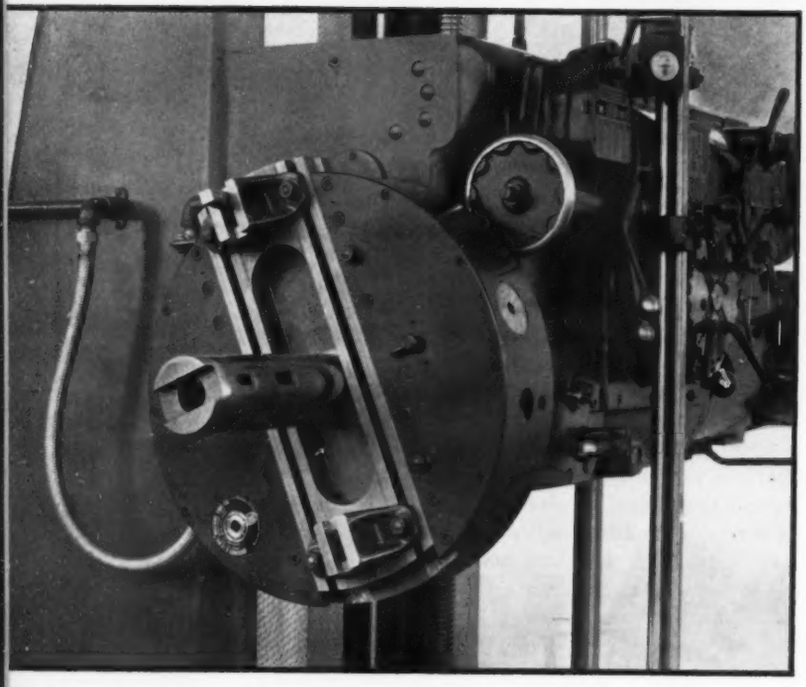
The table top on this machine is approximately 7 in. lower than that of the standard table type machine with an auxiliary revolving table mounted. Thus, the headstock vertical range is increased by 7 in. Also, by making the revolving table an integral part of the machine and mounting it closer to the bed, rigidity of set up is increased.

Eighteen rotary feeds and a rapid traverse may be applied to the rotary movement of the table, while eighteen additional feeds and another rapid traverse is provided for the 48 in. cross travel of the table. The rotary table is graduated in one-half deg., and is provided with four indexing stops with hand adjustment to 0.001 in. This adjustment is obtained through a graduated micrometer dial at 90 deg. intervals. Additional indexing intervals may be provided.

The No. 560-F floor type precision horizontal boring, drilling and milling machine is of heavy-duty design, has a 6-in. diameter main spindle and a 2½-in. diameter auxiliary spindle. Headstock travel is 96 in. and the column unit has a travel of



A built-in power revolving table permits machining a job on different sides in one set-up without mounting an auxiliary revolving table on this No. 340-RT boring, drilling and milling machine



The continuous-feed facing head offered by Giddings & Lewis is arranged for mounting on the spindle sleeve of a horizontal boring, drilling and milling machine

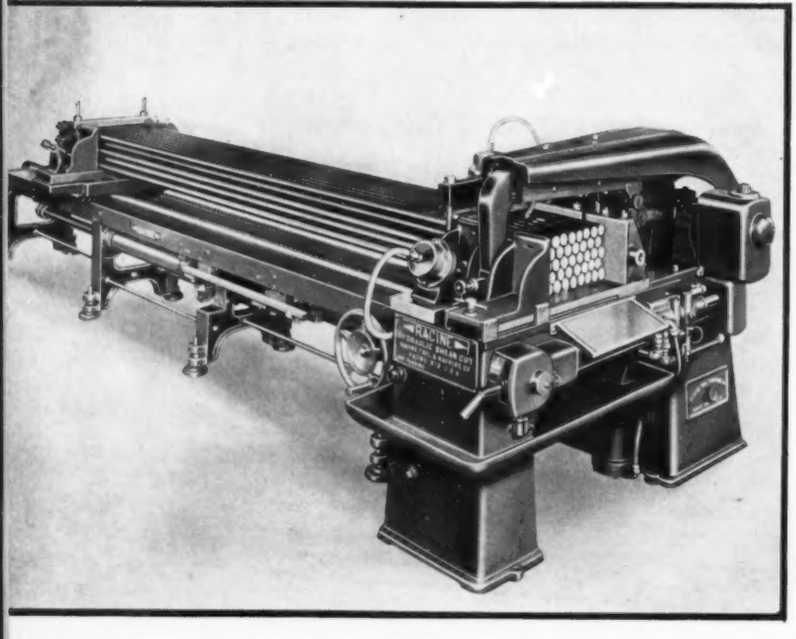
192 in. on the runway. This machine weighs approximately 85,000 lb. and has an over-all height of approximately 18 ft.

In addition to the two spindle arrangements, the following design features have been incorporated in this machine: independent operation of unit, rotary feed selector, wide range of boring and milling feeds, direct reading dials, automatic depth gage, safety limit switches and scales with adjustable verniers, and arrangement of electrical controls to provide flexibility and ease of operation.

A continuous-feed facing head has been added to the Giddings & Lewis line of auxiliary equipment for horizontal boring, drilling and milling machines. This unit is adaptable to practically all machines built by the company, and has a wide range of applications. It is arranged for attachment to the spindle sleeve and is provided with a hardened and ground bushing through which the main spindle can slide freely, making it possible to perform facing and boring operations at the same time. A feed unit to provide six continuous feeds from 0.006 to 0.125 in. per rev. in geometrical progression is built into the facing head to feed the cross slide for facing operations.

Racine Hydraulic "Shear-Cut" Hacksaw Has Automatic Stockfeed Attachment

By means of a low-pressure hydraulic system, the automatic stockfeed attachment shown mounted on a heavy-duty hydraulic "Shear-Cut" metal cutting hacksaw, feeds the stock forward in desired lengths; it is set by a single indicator having a graduated scale.



A full-automatic cycle of operation is possible with the automatic stock feed developed for this heavy-duty power hacksaw

The hydraulic system also clamps and releases the vise jaws, engages the clutch and feeds the saw guide up and down at the correct cutting speeds. This full-automatic cycle is accomplished with the operator free to do other work.

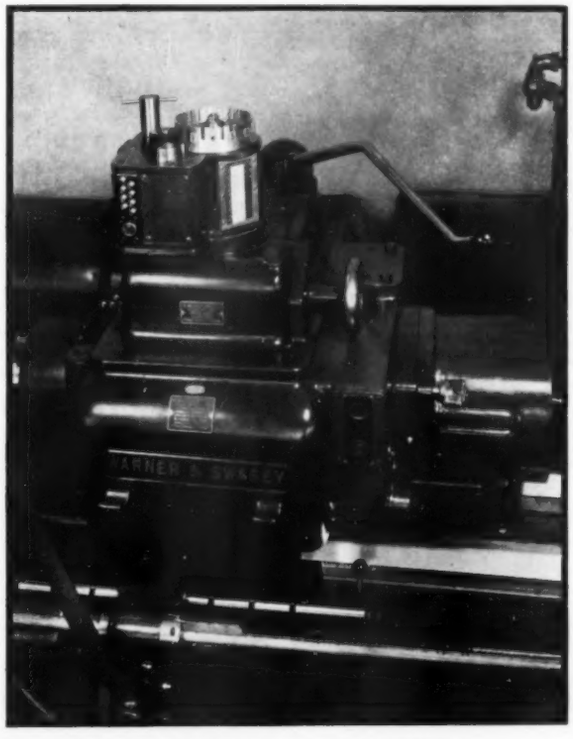
A development of the Racine Tool & Machine Co., 1439 Junction Ave., Racine, Wis., this stock-feed attachment will feed a single bar, or a bundle of bars equivalent to the weight of a 10x10 in. solid section, 12 ft. long. Parallel rectangular steel bars, bolted to heavy cast-iron legs, constitute the track on which the traveling carriage runs. This carriage has a hand-operated vise for holding and gripping one end of the stock. The endless roller chain attached to the carriage is actuated by a feed rack and pinion. Carriage is moved forward by oil pumped to one end of the main feed cylinder, the feed rack being an extension of the main cylinder piston rod. After the carriage moves ahead the desired amount, the rack returns automatically for the next cycle.

Length of pieces to be cut is determined by setting a pointer on a graduated scale, divided into fractions of an inch. The length gage indicator is provided with a screw adjustment for accurate gaging of mul-

tiple lengths within a few thousandths of an inch.

The 10x12 in. capacity saw itself, independent of the stock feed, may be operated as a conventional machine without any changes or adjustments. A single control knob immediately engages or releases the hydraulic circuit to the stock feed system. A handwheel permits moving the carriage or positioning of the work by hand independent of the hydraulic system. This wheel also is used for returning the traveling carriage after the bar is cut. The hydraulic chuck on the machine operates independent of the automatic system and in conjunction with the main control level on the machine. An overhead hydraulic chuck is available for handling multiple pieces.

Turret Movement Controls Speed of Warner & Swasey High-Speed Turret Lathe



Developed especially for brass work, this 16¾ in. swing turret lathe features automatic control of the spindle speeds

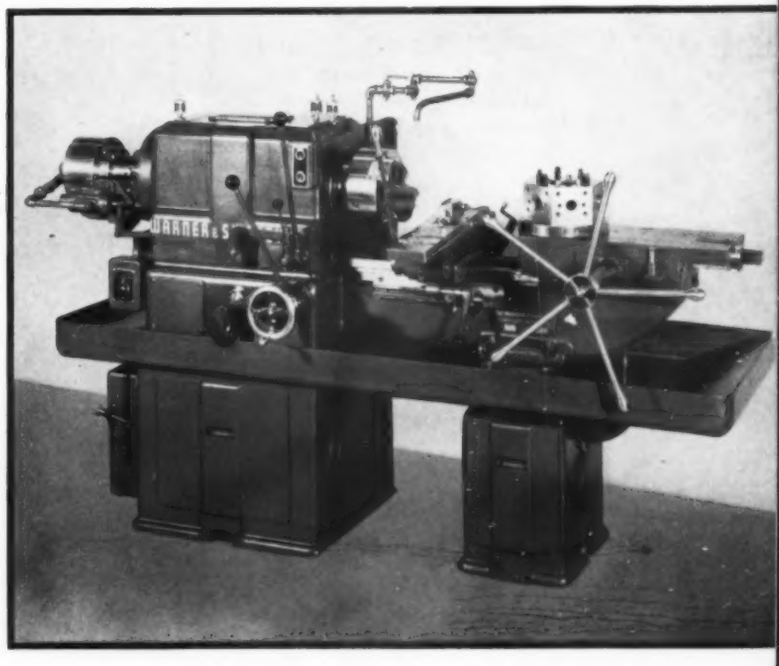
Designed not only for high-speed cutting, but for high-speed operation, the 16¾ in. swing turret lathe announced by the Warner & Swasey Co., Cleveland, Ohio, is especially suitable for brass work. It has a direct two-speed drive and an electrically operated mechanical brake. The turret slide and saddle are completely guarded to keep chips out of vital parts.

One of the features of this machine is automatic control of the two spindle speeds and reverse, which is operated by the movement and indexing of the hexagon turret. With this equipment, the operator only starts and stops the machine once the controls are set. The machine will go through any cycle of the two speeds and forward and reverse automatically. It is designed for mounting a stationary air cylinder to permit faster reversal of the spindle.

Pre-selectors which make proper spindle speeds available and also make it easy to select and obtain these speeds are standard on the Nos. 4, 5, 1-A and 2-A machines. With this preselector, it is necessary for the operator to know only the diameter on which he is working, and the surface speed at which his cuts can be taken. The preselector automatically figures the proper spindle speed and the operator then can obtain that speed with a single lever shift.

While the standard preselector provides for the numbering of a cycle of operations, the improved "program" preselector shown on the No. 5 machine makes this cycle of speeds automatic. After the job has been set up with the proper speeds, the unit can be locked. The program device automatically will select the next speed, while a cut is being taken. In this way any number of speeds up to eight may be selected and locked into the mechanism.

The "program" preselector makes a cycle of speeds automatic once the set-up has been completed



The

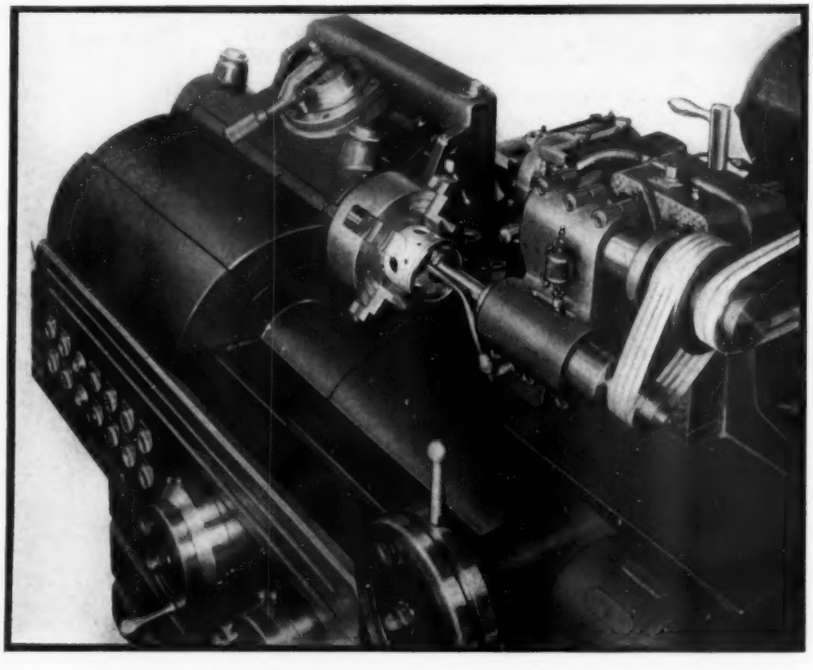
Ex-Cell-O Internal Thread Grinder Has Capacity for 10-In. Diameter Parts

An internal precision thread grinder developed by Ex-Cell-O Corp., 1224 Oakman Blvd., Detroit, Mich., features automatic wheel dressing. This grinder is designed especially to grind internally threaded parts requiring accurate thread form, close size and good finish, on an economical production basis. It will grind holes up to 9½ in. in diameter, having as much as 4-in. length of thread, in parts up to 10 in. outside diameter and 13 in. long. Half-round scraped ways in the machine base support the table and work drive head, which normally traverse in the grinding position. The table and work head can be power indexed or swivelled from the grinding position toward the operator to a gaging, loading and dressing position.

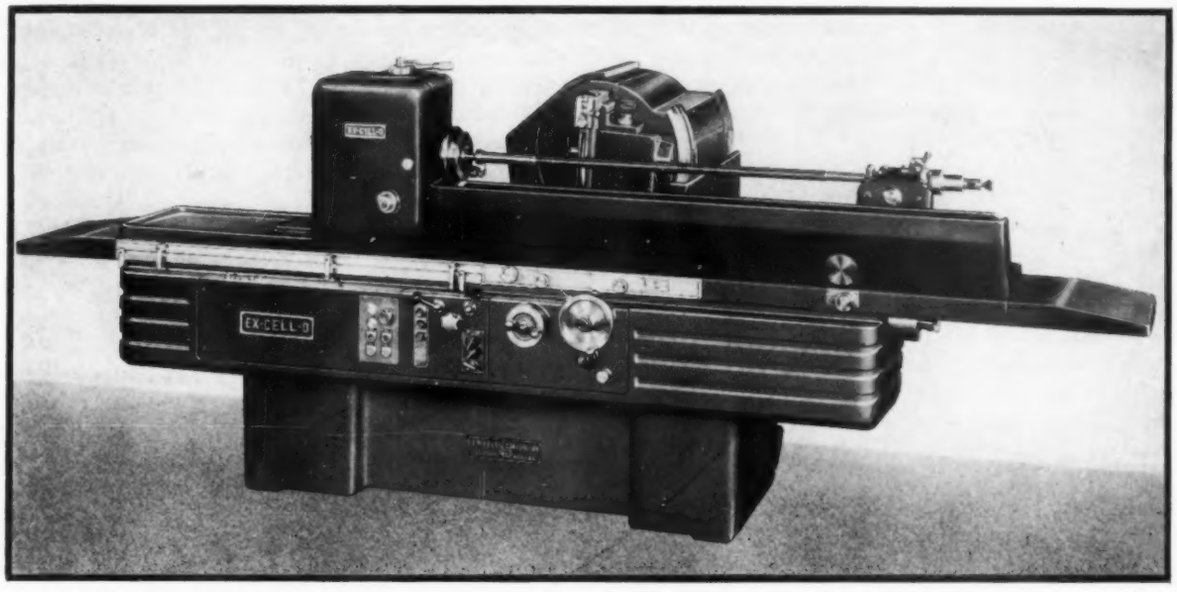
After the work head is indexed, the grinding wheel dresser can be power actuated to the dressing position, where it performs its cycle automatically. Machine movements are electrically interconnected and interlocked so that the work, grinding wheel, wheel dresser and operator are fully protected. Either a plain or universal dresser can be used. The plain or straight line dresser is adjustable to true the grinding wheel for U. S. Standard, 60 deg. sharp V and 29 deg. Acme threads. The universal dresser will dress the wheel for these forms, and also for modified Buttress, Whitworth and other special radius forms. Since dressing in either case is done on the side of the wheel which engages the work, the dresser acts as a sizing device for controlling work diameter.

Lead accuracy is assured by the use of interchangeable master lead screw and nut assemblies, like those used in Ex-Cello-O external thread grinders. A positioning or lead pick-up device allows the operator to locate previously roughed threads in correct relation to the grinding wheel. The machine will grind in both directions of work rotation and table travel without an undercut on the work or running the wheel off the work. A taper attachment permits grinding up to 6 in. taper per foot. The grinding wheel spindle is

Machine movements on the Ex-Cell-O internal precision thread grinder are electrically interconnected and interlocked to protect the work, wheel, dresser and operator



Work drive head traverses on half-round scraped ways in the internal thread grinder announced by Ex-Cell-O

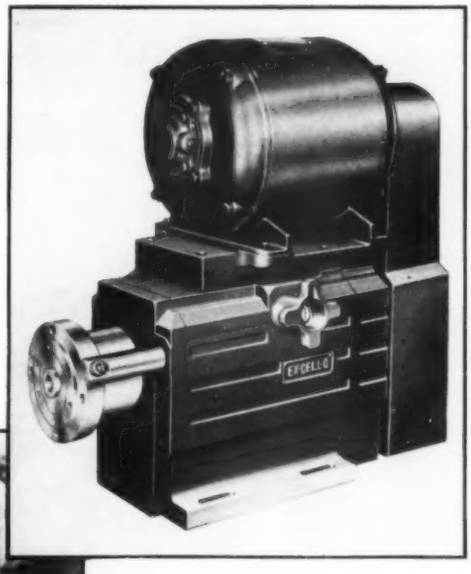


Hydraulic motor provides infinitely variable range of work speeds on the Style 50 Ex-Cell-O thread grinder

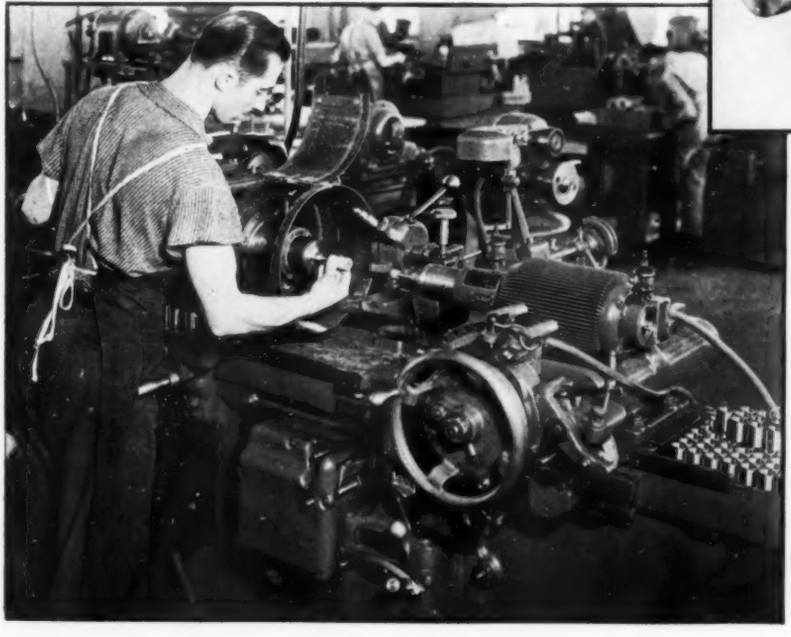
mounted on the front face of the cross slide and is adjustable for helix angle. Spindle speeds up to 18,000 r.p.m. are available.

Hydraulically operated and controlled, the Style 50 precision thread grinder will grind threads up to 12 in. in diameter and 50 in. long on work up to 115 in. long between centers. An infinitely variable range of work speed is provided by an hydraulic motor, making possible the selection of the correct work speeds for maximum production and wheel economy. Work table movement and work speed changes are adjusted by controls conveniently located.

Automatic features of the machine include: auto-



Ex-Cell-O's small hydraulic power unit provides spindle speeds from 370 to 1590 r.p.m.



Delivery of steady power to the grinding wheel is claimed for this motor driven spindle

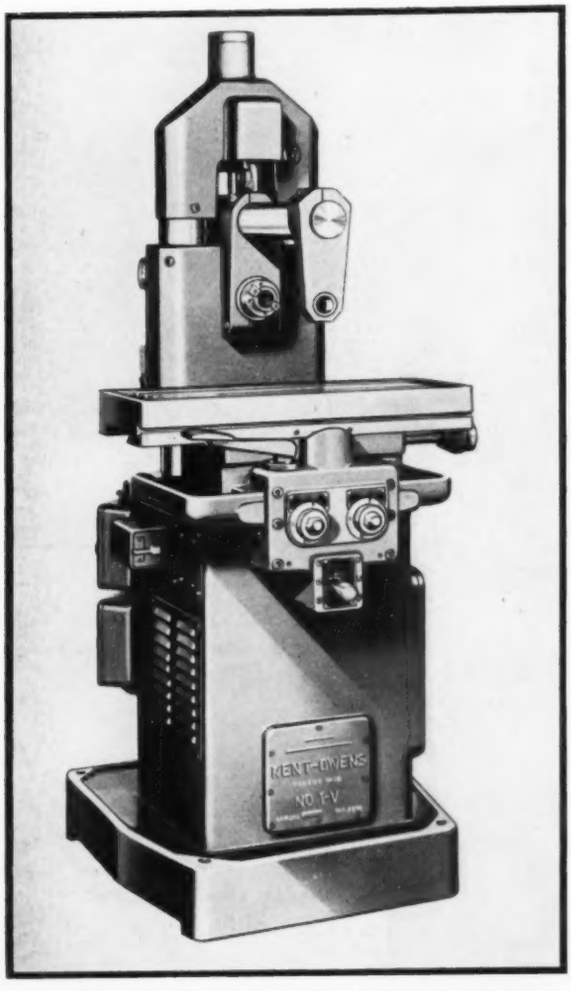
matic grinding wheel infeed, to compensate for the amount dressed off the wheel; automatic dressing device, used at grinding speed to insure rapid and accurate trueing under operating conditions; and automatic backlash compensator, for grinding in both directions. This backlash compensator automatically and instantly operates at each reversal to insure that the grinding wheel will follow the same thread track. Work can be reversed while the grinding wheel is in the thread cut; it is unnecessary to have an undercut or to run the wheel off the work.

A lead control device permits lengthening or shortening the lead to suit characteristics of the work. The machine will grind right and left hand, single or multiple threads having any of the standard forms, as well as special symmetrical or unsymmetrical forms.

A small hydraulic power unit having spindle speeds from 370 to 1,590 r.p.m. also is announced. This unit will handle drills from $\frac{3}{16}$ in. up. With a multiple head or speeder unit, smaller drills may be used. Maximum stroke of the unit is $4\frac{1}{8}$ in. It can be powered by motors up to 3 hp. and is capable of drilling a $\frac{3}{4}$-in. hole in steel. It weighs only 220 lb. The unit can be used to rotate and feed a single tool or multiple spindle head on drilling, reaming, facing and similiar operations. It also is suitable for use as a prime mover for other machine units on milling, boring and other operations. After starting, the operating cycle of the unit is automatic and provides uniform rapid traverse in both directions, adjustable forward feed, and either return or positive stop dwell and return.

The principal advantage claimed for the Ex-Cell-O built-in high-cycle motor driven grinding spindle is delivery of more and steadier power to the grinding wheel. Slippage and vibration of standard belt drives is eliminated in this spindle, and it is claimed that close size limits are easily held on a high production basis when internal grinding.

Kent-Owens Miller Has Vertical Hydraulic Feed



Vertical feed to the spindle, instead of power feed to the table, is a principal feature of this Kent-Owens miller

The No. 1-V horizontal spindle machine developed by Kent-Owens Machine Co., 958 Wall St., Toledo, Ohio, features an automatic hydraulic vertical head feed. It is suited for milling Woodruff keyways, cutting-off operations, milling tongues and slots in the ends of shafts, and similar operations. As compared with the use of horizontal table feed on many operations, this machine provides the operator with a clear view of the work, and is convenient for loading and unloading.

The head movement is actuated hydraulically by a separate motor-driven pump which is mounted as a unit assembly in the base. It has vertical feed in the down direction only and rapid travel in both up and down directions. Any feed from 1 to 80 in. per min. can be obtained by operating the control dials on the front of the machine.

Head is mounted on two cylindrical steel posts with the head actuating cylinder and piston assembly above them. This head is counterbalanced so that it will not settle to a lower position when the machine is idle. Spindle is driven by a standard ball-bearing motor at the rear of the machine. There are only two gear contacts between the motor and the cutter. One of these is a pair of pick-off gears by means of which any speed from 100 to 2,000 r.p.m. can be obtained.

The table is 9 in. wide and 25 in. long, and is provided with three T-slots. It is adjusted lengthwise by means of a screw and micrometer dial for positioning the work under the cutters. A cross adjustment of $2\frac{1}{2}$ in. is obtained by means of a quill with a micrometer dial adjustment. A coolant system can be arranged as an integral part of the machine. There is no piping inside or outside the machine except the nozzle leading to the cutter.

SHOW IN PRINT

Van Norman Ram-Type Universal Millers Use Heavier Construction

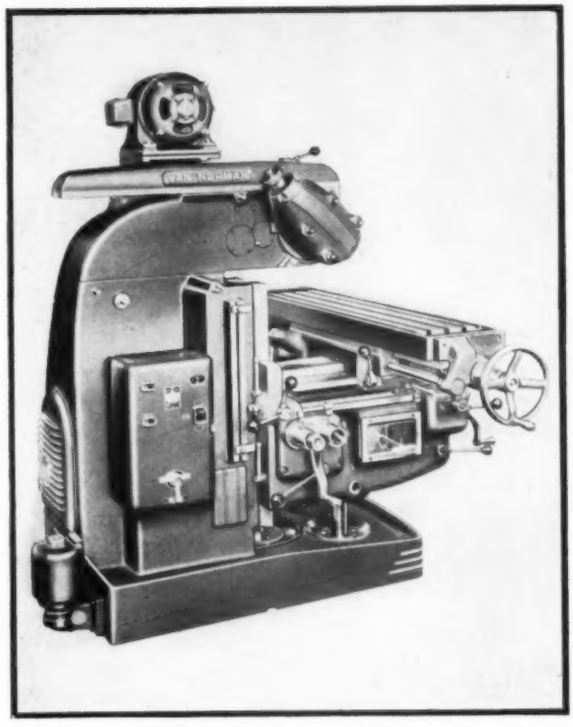
The No. 26 and No. 36 ram-type Universal milling machines, offered by the Machine Tool Division of Van Norman Machine Co., 160 Wilbraham Ave., Springfield, Mass., have been completely redesigned. The improved gear transmission has heavier gears mounted on spline shafts rotating on ball bearings. A convenient speed-change unit provides eighteen changes of speeds from 30 to 1,500 r.p.m. in geometric progression. Speed changes are made simply by shifting two levers on the front of the ram with "high" and "low" series obtained by a push-pull knob.

Cutter-heads have been made larger and have increased bearing surface on the ram. An improved method of locking the head to the ram by means of four bolts assures rigidity, which, combined with hardened and ground spiral bevel drive gears, provides for taking heavy cuts. The cutter spindle is large in diameter and has double opposed Timken bearings on the front end. The back end is mounted on ball bearings to compensate arranged for expansion.

The ram-type overarm is 43 in. long and provides outboard support for cutters and attachments. The streamlined column has added way length for holding the ram unit. Feed motor is inclosed within the column. The base contains a coolant tank and provision is made at the back of the machine for an independent motor-operated pump.

The improved knee assembly contains the entire feed-change transmission unit, operated through a vertical multi-splined driveshaft from the drive unit located in the base and column. The eighteen feed changes are selected by means of a single lever feed selector accessible both from the front and rear of the machine.

Front and rear control of the saddle and knee feeds are provided by means of convenient ball handle levers actuated in the direction of movement desired. Rapid traverse is provided in six directions of table, knee and saddle travel. A one-shot lubrication unit oils the table, knee ways, and the saddle mechanism. The table of the No. 26 and No. 36 machines measures 50x12 in. and 58x13 in., respectively. Permanent safety stops are on the lower front face of the table.

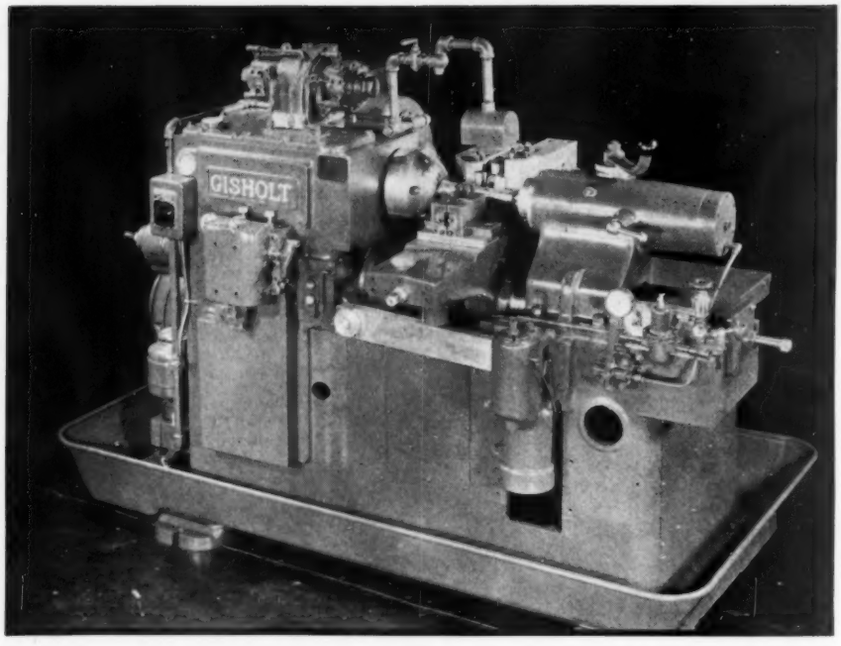


A 50x12-in. table is provided on this No. 26 Universal miller, which has been redesigned

"Vari-Pitch" Speed Changers Have Improved Motor Base

The "Vari-Pitch" speed-changer units made by Allis-Chalmers Mfg. Co., Milwaukee, Wis., now include twelve sizes that will handle loads up to 75 hp. with variable ratios of 3:1. For all of these units, there has been developed a base especially designed for use where floor space is at a premium. The motor and base are mounted directly above the speed-changer unit. This base automatically maintains the correct tension on the drive at all times.

Adjustable motor base on speed-changer units now is mounted on top of the unit's housing



Ease of set-up is featured in the No. 12 hydraulic automatic lathe announced by Gisholt

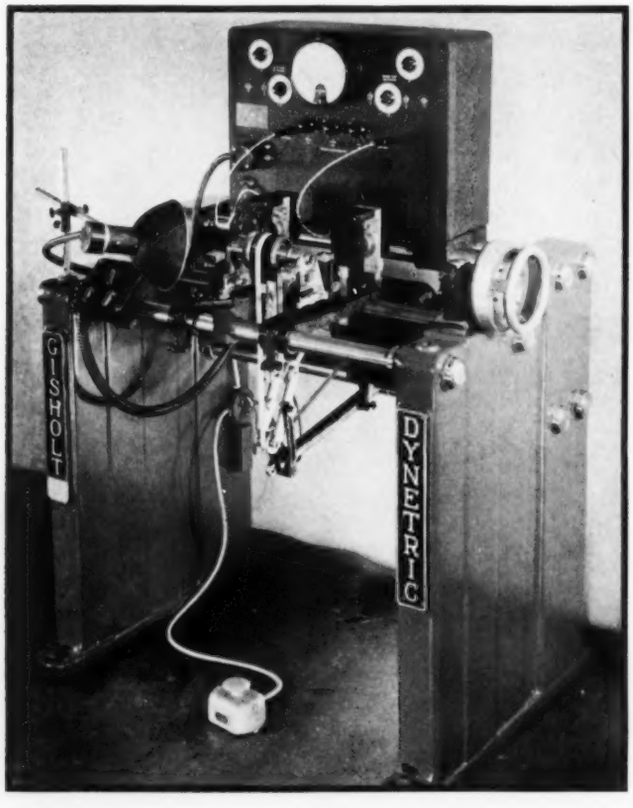
Gisholt Offers Automatic Lathe and "Dynetric" Balancers

The No. 12 hydraulic automatic lathe introduced by Gisholt Machine Co., Madison, Wis., is designed so that the operator only has to place the work in the machine and pull the control lever. It is adaptable to a wide range of applications including between-centers work, arbor work, chucking work, or work that must be handled in fixtures. It is said to be ideal for high production manufacturing yet, due to its flexibility and ease with which it can be changed from one job to another, it is equally well adapted to manufacturing a variety of parts even in small lots.

The adaptability of the machine to a wide range of work, as well as the flexibility of change-over from job to job, are due largely to the means used for obtaining the slide motions, and to the method of controlling the machine functions. The tool-carrying slides receive power for their motion through fluid pressure acting on the slide pistons. A large-volume gear pump provides fluid power for rapidly moving the slides at a traverse rate and individual plunger-type pumps provide accurately metered quantities of fluid for advancing both the front and rear slides at the rates of feed desired.

Shifting the control lever upward causes the spindle to rotate and the slides to advance rapidly to the work piece. When the tools reach the proper position, the slide pistons encounter adjustable positive "traverse stops" and the rapid rise in fluid pressure is transmitted to the central control valve which automatically shifts the control lever to the "feed" position. The control of feeding motion by abutment against dead stops insures utmost precision and exact duplication of machined dimensions.

At the end of the cutting stroke, when the dead stop is encountered and further movement arrested,



Only vibrations which occur once each revolution of the work piece are indicated on the "Dynetric" balancing machines. All other vibrations are tuned out electrically so as to insure accuracy of readings

continued delivery from the feed pump increases the fluid pressure which automatically shifts the control valve to the rapid-return position. The slight dwell against the stop while the pressure builds up tends to relieve the strain in the work piece and to permit the tools to cut free. During the rapid-return motion of the slide to the starting position, the clutch spindle is disengaged and the brake is applied. At the completion of the rapid-return motion, the control lever automatically is shifted to the "stop" position.

Since the hydraulic power for actuating the control of the slide functions is transmitted through the same fluid pressure medium that supplies the power for slide motion, the adjustment of traverse and feed trips is merely a matter of loosening, setting and locking ordinary stop screws. There are no cams to change, no mechanical trip linkages to adjust, and no trip dogs to set. Also, the range of action, the location, and direction of motion of the slides can be varied easily between wide limits.

"Dynetric" balancing machines provide a means for quickly and accurately locating and measuring the unbalance in rotating parts or assemblies. Dynamic unbalances so small as to cause a movement of less than 0.000025 in. of the work piece at its bearings are indicated in the machine. The work piece is freely supported, not restrained at either end. Correction for unbalance is indicated directly at the points where corrections are to be made, and without stopping the machine.

The balancing is done at speeds to compensate for non-symmetrical distortion in the work. In the Type S machine shown, the range of speeds at which balancing is normally done may be any speed from 750 to 2,000 r.p.m. In the Type U machine, which is used for balancing larger parts, the range of speeds is from 300 r.p.m. and up. No manipulation or adjustment of speed is required.

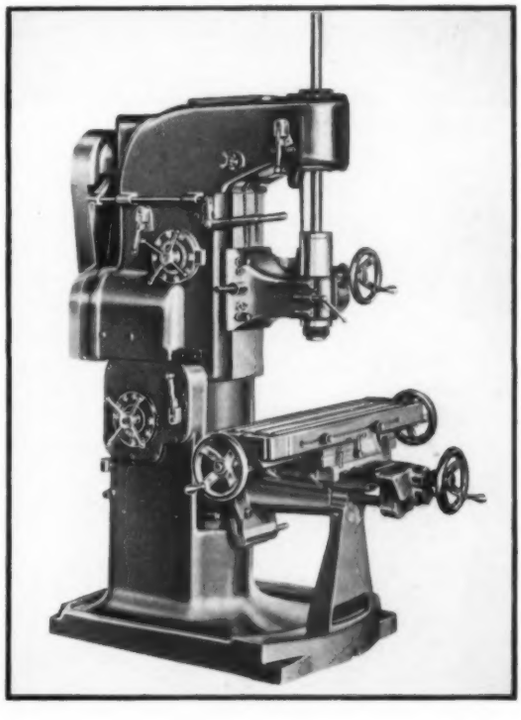
The unbalance is indicated electrically, no optical or mechanical levers or devices are used. The electric circuit is without make and break contacts or commutator devices. Vibrations from the floor or other external disturbances are tuned out electrically. Only those vibrations that occur once each revolution of the work piece are indicated. Vibrations caused by unbalance of the work piece are greatly amplified without distortion or dampening effect, so that the most minute unbalance is accurately indicated and easily read.

An infinitely variable ratio of amplification is provided so that either a large or an extremely small amount of unbalance can be measured. Only two switches are used to obtain the amount and angular positions of corrections required in both correction planes. This is done without calculation or reference to curves or charts because the scale on the meter may be adjusted to show the depth of hole to drill or amount of weight to be added or removed. These machines can be arranged to measure either pure static or pure dynamic unbalance, or the combined effect of static and dynamic unbalance in two arbitrarily selected planes of correction.

Knight High-Speed Vertical Miller Designed for Precision Boring

The No. 20 high-speed vertical milling machine developed by W. B. Knight Machinery Co., 3920 W. Pine Blvd., St. Louis, Mo., can be equipped with precision measuring instruments for jig boring work. Also, it can be equipped with circular milling, index milling and shaping attachments. This machine incorporates the tilting and swiveling table featured on the No. 30 and No. 40 vertical millers.

Specifications: Table travel with longitudinal power feed, 23 in.; table travel with transverse power feed, 10 in.; maximum distance from table to spindle, 18½ in.; spindle head travel on column, 12 in.; spindle travel in head, 6 in.; working surface of table, 9 x 36 in.; number of spindle speeds, 16; range of spindle speeds, 100–2,000 r.p.m.; weight, including all regular equipment, 3,000 lb.



Attachments available for use with the No. 20 vertical miller include precision measuring units for jig boring operations

The

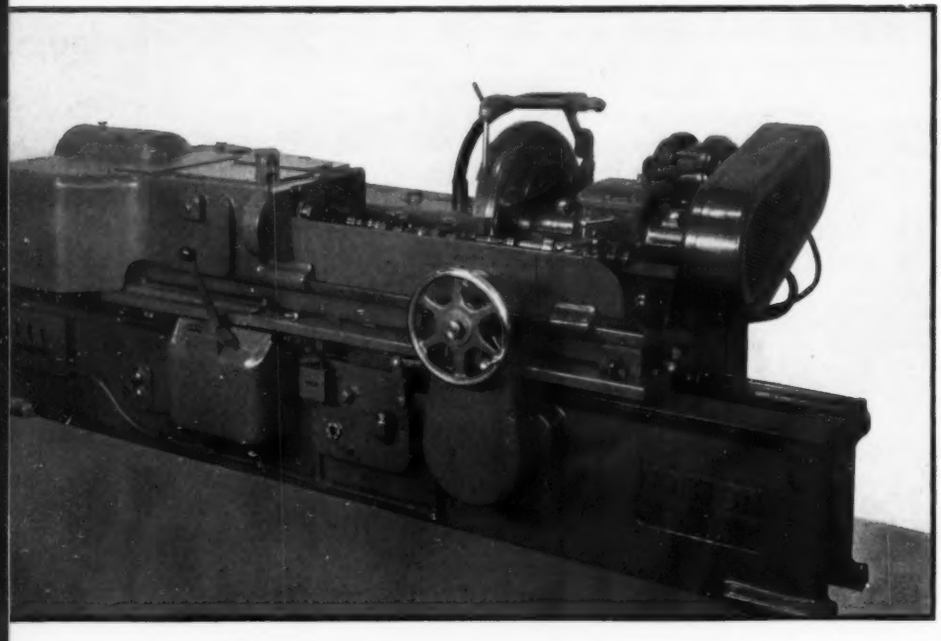
Norton "Cam-O-Matic" Grinder Feeds Work to Wheel

The 5x30-in. "Cam-O-Matic" automatic cam grinder developed by Norton Co., Worcester, Mass., is arranged so that the work is fed into the wheel, rather than having the heavy wheel unit fed into the work. Because of the frequency of contacts between wheel and work, the ways of the relatively heavy wheel unit are subjected to a large amount of service in previous designs. In this improved grinder, the lighter work-holding member is the one that is operated frequently. Manufacture is simplified by using a standard 10-in. Type C wheel unit on this machine.

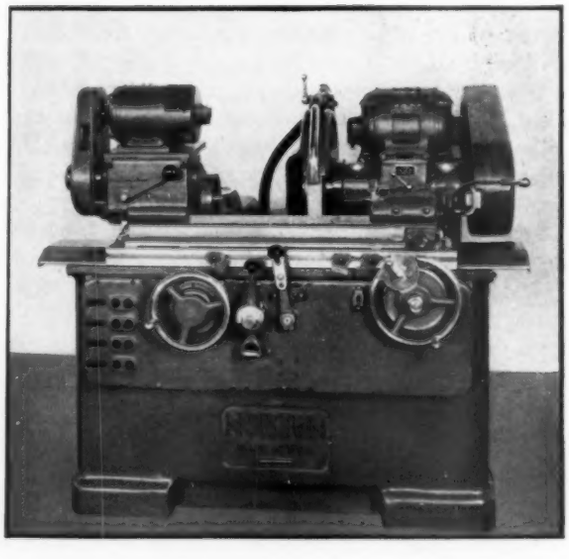
Feed is accomplished with an eccentric master cam roll shaft which is rotated through part of one revolution by an oil motor. Cam size is obtained when the eccentric motion of the roll shaft is arrested by a positive stop, this being the position of the roller with relation to the grinding wheel when the master cams are generated. An extremely fine feed can be obtained.

Timing of the cycle is controlled from the revolution of the shaft and the oscillation of the rocking bar which supports the master cams and the product. Each cam makes the same number of revolutions in contact with the grinding wheel and this number is readily adjustable by turning a simple knob conveniently placed for the operator. Termination of the grinding cycle is governed by a limit switch operated by a cam in the timing unit. The cycle can also be interrupted at any time by a push-button. The machine is controlled primarily by a single lever and a pushbutton to start the work. Steady rests are opened or closed with one hand. Oil and coolant pumps are individually motor driven, and are spring mounted to prevent the transmission of vibration. All electrical controls are built into a cored receptacle at the rear of the base, thus isolating them from dust or moisture.

The improved 6x18-in. Type C cylindrical grinder has been redesigned to improve operating convenience and accuracy. In addition it has capacity for higher production than previously was obtainable. All mechanisms now are easily accessible for adjustments. The headstock has an eccentric take-up of the drive chain for keeping it in proper tension at all times. Larger centers are used in headstock and footstock.



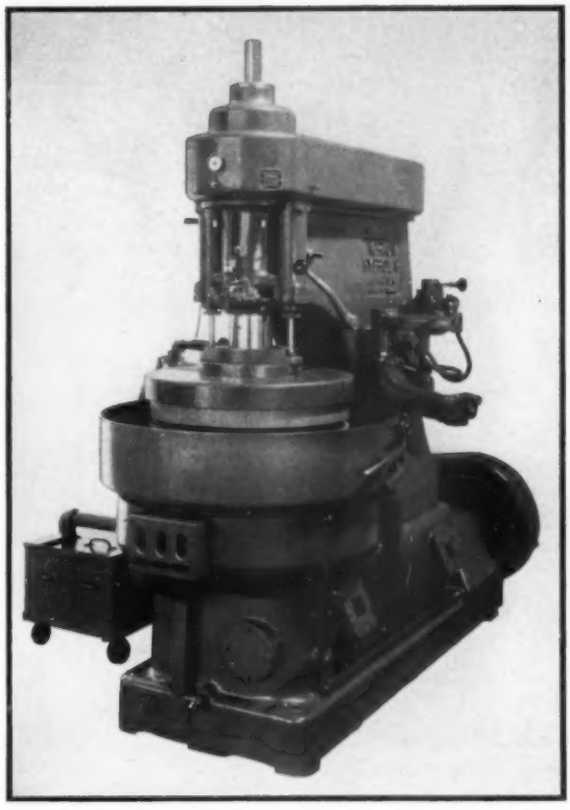
An eccentric master cam roll shaft controls the feed of the work to the grinding wheel on the 5 x 30 in. "Cam-O-Matic" grinder



A number of improvements have been incorporated in the Norton 6-in. Type C cylindrical grinder

Coolant and oil pumps are individually motor-driven, run submerged and are spring mounted. A separate pump supplies lubricant to the table and wheel slide ways. Electrical controls are built into the back of the machine, cored openings in the base being provided for that purpose. Protective telescoping guards are furnished for the base ways.

The No. 26 "Hyprolap" machine employs two bonded abrasive laps. It is a fast cutting machine, the number of parts finished simultaneously in one load depending upon their size. Automotive parts, such as piston rings, and refrigerator parts may be mirror finished within close limits of parallelism. The machine can be adapted for either flat or cylindrical work. A lever regulates the lapping pressure, which can be adjusted for from 20 to 100 lb. per sq. in. An hydraulically controlled swinging arm carrying two diamonds trues the upper and lower lap faces simultaneously.

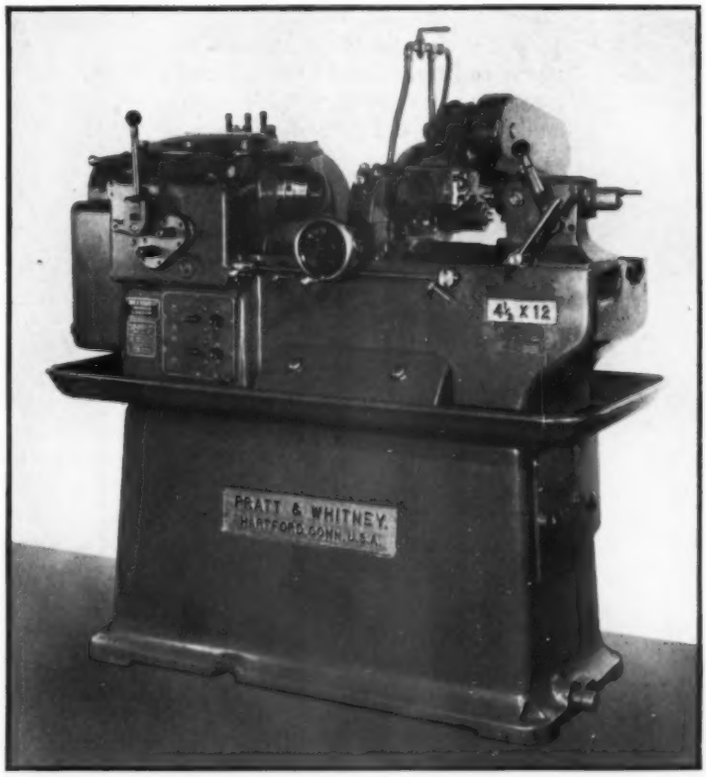


Flat or cylindrical work can be lapped to a mirror finish on the No. 26 "Hyprolap"

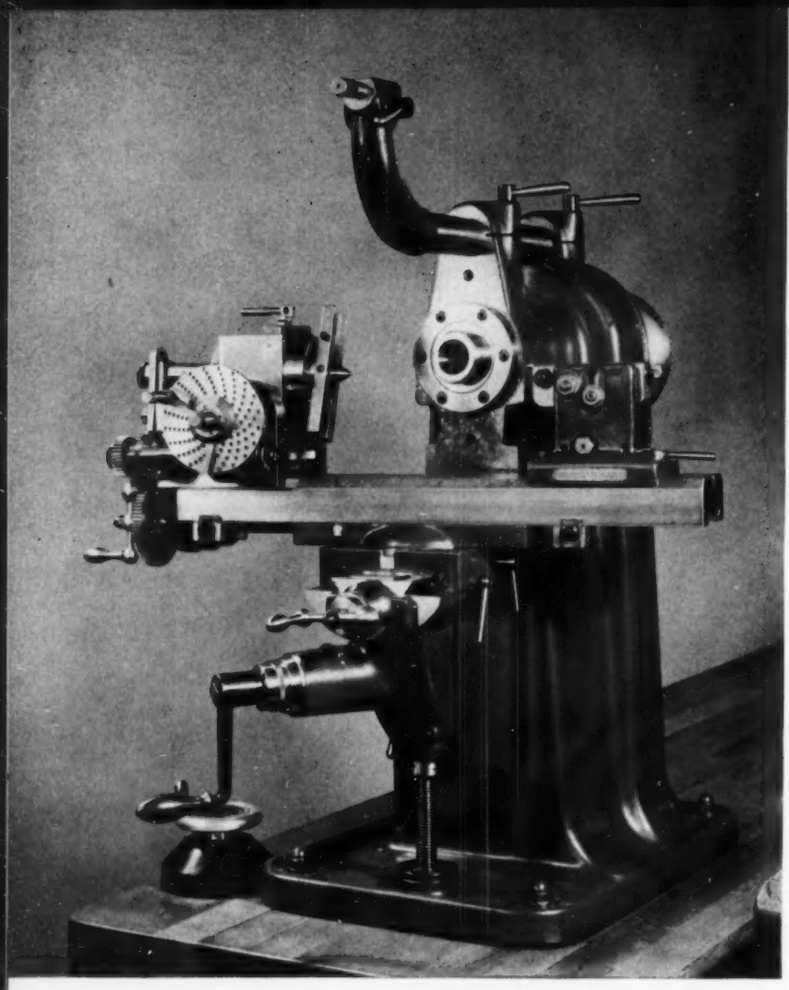
Pratt & Whitney Model C Thread Miller Has 4 1-2-in. Capacity

The 4½-in. capacity Model C thread miller brought out by Pratt & Whitney, Div. Niles-Bement-Pond Co., Hartford, Conn., is made in two nominal sizes. One has a 12-in. maximum distance from the collet nose to the tailstock center, this distance is increased to 36 in. in the larger model. The first requires a floor space of approximately 36 x 58 in., the second 36 x 82 in. The machine is arranged for motor drive only, with a ¾-hp. reversible motor driving the cutter spindle and a ½-hp. motor connected to the work spindle. Each motor is arranged with built-in automatic starter and pushbutton control.

Both machines will take work up to 4½ in. in diameter, and will cut to a depth of $\frac{1}{32}$ in. with a 2⅛-in. diameter cutter. This is reduced to $\frac{5}{32}$ in. when using a 1¾-in. diameter cutter. A 12-in. lead can be cut on a 4-in. diameter piece. The minimum lead that can be cut is 24 per inch. There are sixteen work spindle speeds ranging from 0.25 to 20 r.p.m. The five cutter



Work as large as 4½ in. diameter can be handled in this Model C thread miller announced by Pratt & Whitney



Pratt & Whitney's No. 3-C universal bench miller can be used at speeds as high as 1,500 r.p.m. It can be equipped with a universal indexing head and footstock

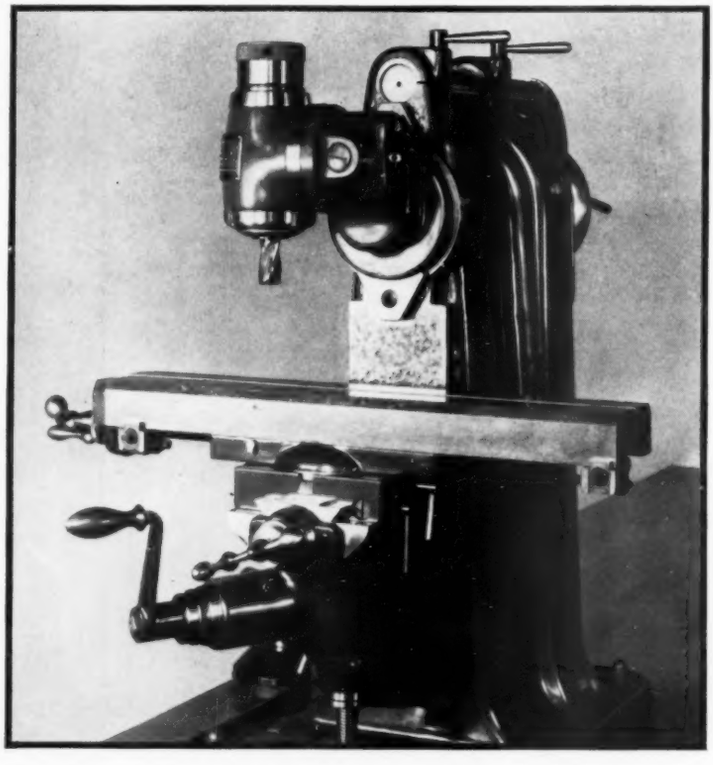
The

spindle speeds range from 205 to 810 r.p.m. A motor-driven coolant pump and piping is mounted on the machine.

Pratt & Whitney also has announced development of a No. 3-C universal bench miller having an 18 x 2¾ in. table working surface. This machine is arranged with an overhanging arm and is equipped for motor drive only. Either a.c. or d.c. motors of ½-hp., 1,200 r.p.m., capacity can be used. The motor is direct connected to a Transitorq drive unit with suitable switch and manual speed control. Spindle is driven by multiple V-belts from the drive unit. When equipped with a standard motor the spindle speeds range from 150 to 1,500 r.p.m. With a two-speed motor, spindle speeds are in two ranges. The low range is from 75 to 750 r.p.m. while the high range is from 150 to 1,500 r.p.m.

Longitudinal table travel is 9¼ in., while transverse table travel is 2⅝ in. Maximum distance from the center of the table to the end of the spindle is 3⅜ in., minimum distance is ¾ in. The knee has a vertical movement of 7 in. and distance between centers using the universal indexing head furnished with this machine is 7 in. maximum. This machine requires a bench space of 30 x 23 in. and is 24 in. hight. Net weight is 350 lb. Spindle is mounted in preloaded ball bearings and has a drawback sleeve for collets. Two table stops and one knee stop are provided. The miller is equipped with three arbors of ¼, ⅜ and ½ in. diameters.

A standard work bench with top measuring 24 x 72 in. and fitted with two tool drawers is available for this bench miller. The bench is arranged for mounting the Transitorq drive unit directly under the miller, with the manual speel control wheel conveniently placed on the top of the bench beside the machine. Collet capacity of this machine is $\frac{1}{16}$ to ¾ in. diameter and collets in $\frac{1}{32}$ in. steps between these diameters are available. A standard right-angle adapter is available for mounting on the end of the spindle so that vertical milling operations can be performed. The vise available for use with this machine is of the graduated swivel type and is 2½ in. wide. It opens $1\frac{5}{16}$ in.



Both a right-angle adapter and a universal milling attachment are available for use with the No. 3-C universal bench miller

SHOW IN PRINT

Landis Grinders Combine Electrical Control and Hydraulic Operation

THE 16x40-in. Type IW hydraulic grinder announced by Landis Tool Co., Waynesboro, Pa., provides automatic multiple wheel grinding once the grinding cycle has been started. This machine has the grinding wheels mounted between the wheel spindle bearings because of the wide spacing of the surfaces to be ground on the parts. A typical operation on this machine would be the grinding of several main bearings, and the outside diameters of the flange of a crankshaft.

One of the major feature is the work loading and unloading device. The shaft is place in this device, which is low and at the front of the machine, so as to require the expenditure of minimum effort on the part of the operator. It is counterbalanced, and as soon as the shaft has been placed in it, the operator simply gives the shaft a slight push. The device then carries the shaft down between the work centers where the footstock center automatically advances and picks it up. With the advancing of the footstock center, the lateral locator swings down from the front of the wheel base into operative position. Next, the operator checks his indicator, bumps the table traverse handwheel until the locator reads 0 and depresses the cycle start button. The locator then recedes to its inoperative position, work rotation starts, the wheel base feeds in and grinds the work down to size, at which point an electric timer comes into play and controls a fixed spark out period. Following the spark out period, the wheel base moves to its back position rapidly, work rotation stops, and the footstock center recedes, dropping the shaft into the loading device which carries it upward to the front of the machine.

There is a work rest with hydraulically operated shoes which come into play automatically at the proper time in the cycle. Controls are almost entirely electric. Pushbuttons start the cycle, return the cycle, stop the cycle at any point, start all of the motors of the machine, but the work drive motor regulates the hydraulic wheel dresser, jog the work and provide individual control for the lateral locator. The headstock face plate has a multiple V-belt drive from a constant speed motor. The footstock spindle is operated hydraulically and hydraulic power moves the lateral locator into operating position.

The wheel spindle is driven on the end by multiple V-belts. It carries 42-in. diameter grinding wheels between the bearings, which are of the spherical self-aligning type. These bearings are made of babbitt lined through multiple V-belts, two step cone pulleys makable cartridges. A separate wheel spindle bearing lubricating system is provided. Through the medium of a pressure switch, the machine is arranged so that the wheel drive motor cannot be started until pressure in the wheel spindle bearing lubrication system has risen to a predetermined point. The entire water service is in a sliding hood at the front of the base.

Wheel base guides and feed screw are lubricated periodically with a metered amount of lubricant. The work carriage is traversed by hand. A coolant system is not built into the machine, but connections are provided for hooking onto a central coolant supply system. When required, a reservoir may be made in the foundation at the left side of the machine or a separate reservoir may be placed on the floor at the rear. A 40-hp. motor drives the wheel spindle and four other

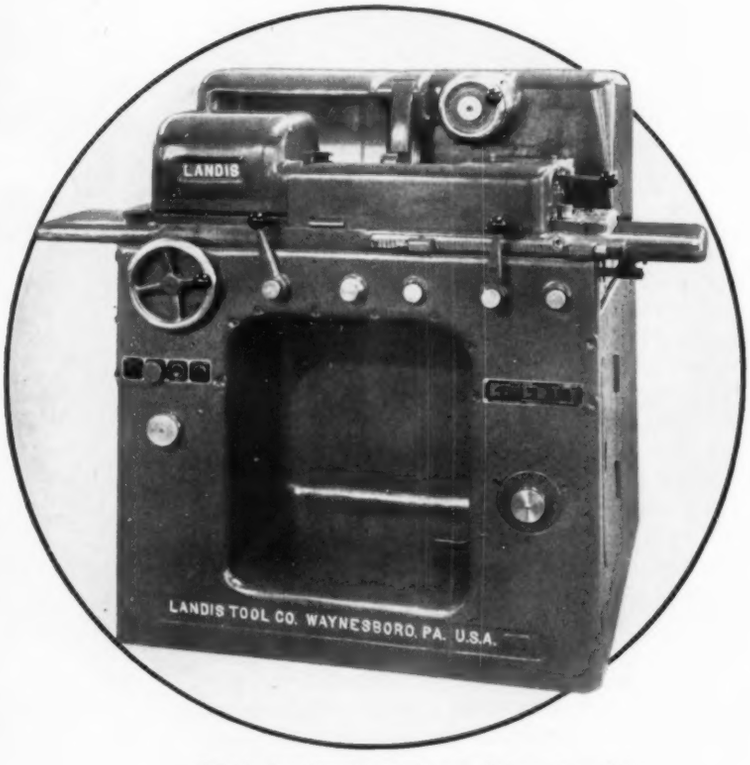
Operation of the 16x40 in. Type IW hydraulic grinder is automatic once the cycle has been started

motors are required on the machine. Weight of the machine is 50,000 lb.

The 4-in. Type H plain hydraulic grinder has been developed to grind rapidly work up to 1½-in. diameter It is a low machine which may be operated either from a standing or sitting position, as the bed is deeply recessed in the front. The controls and adjustments used permit the operator to make positive settings quickly. Electrical and mechanical controls are interlocked to save operating effort.

For example, the traverse reversing lever is provided with three stages either side of center. The first is for traverse grinding, the second for wheel dressing, and the third for fast traverse. Traverse grinding speeds are adjustable from 6 to 180 in. per min. The wheel dressing speed is slow and also is adjustable. The fast traverse speed is constant and is used to position the table quickly for wheel dressing, for convenience when setting up the machine, and to move from one diameter to another when the two are widely separated. Provision is made for tarry at points of work carriage reversal.

There is a control for the purpose of selecting the hydraulic cycle, that is, setting the machine to function as a traverse grinder or as a straight infeed grinder. The hydraulic straight infeed mechanism is a part of the start equipment that is controlled from the front of the bed. Starting and stopping of work spindle rotation is tied in with the movement of the wheel base. Coolant flow starts and stops automatically with the work spindle.



Electrical and mechanical controls have been interlocked on the Type H plain hydraulic grinder to save operating effort

All electric controls are grouped at the left-hand side of the bed. The master start button starts the wheel drive and pump drive motor and also serves as a work jog. Another button serves as a master stop. A work speed selector permits the oprerator to select or duplicate any particular work speed.

The work drive motor is connected through multiple V-belts to the face plate, which is carried on ball bearings. The lever operated footstock has a diamond holder bar built into its base. Automatic lubrication of the flood type is from a reservoir located in the base. Drive is to the end of the wheel spindle through multiple V-belts, two step cone pulleys making it unnecessary for pulleys to be changed in order to maintain wheel speed as the wheel wears down. A 16x1x8 in. wheel is standard although under certain circumstances one as wide as 3 in. may be used. Backlash is taken up hydraulically.

Swiveling of the work table is by screw adjustment, a graduated dial giving readings in terms of 0.001 in. per inch of taper. A water reservoir is integral with the rear portion of the bed, and a vertical individual motor-driven coolant pump is used. The type H grinder is available in 4 x 12 and 4 x 18 sizes. The former weighs 3,500 lb., the latter 3,800 lb.

Intended for the production grinding of very small ball-bearing raceways, the No. 1 "Race-A-Way" grinder features an automatic sizing device. Because of the small size of the races ground, there is no room in the race for a sizing device finger during the grinding operation. The device used on this machine controls the size of each race ground by compensating automatically for any slight error found on the race previously ground. The basis of this method of sizing is the "Landis-Solex" system, which means that the restriction of the flow of air between an air jet and a sizing finger causes mercury to rise in a mercury swich, thereby closing contacts at the proper time in the cycle and controlling the machine movement.

The sizing device in combination with an electric timing device enables the machine to perform three operations during the single grinding cycle. The race is rough ground at a normal feed up to the point where only a small amount of stock is yet to be removed. The sizing device brings the slow grinding feed into play and the race is finish ground. With the work practically to size, the slow feeding movement stops, work-head oscillation stops with the wheel head centered, the electric timing device is engaged and for a fixed but exceedingly brief period of time the wheel sparks out until the work is down to size.

The grinding wheel spindle operates at 50,000 r.p.m. and runs in super-precision ball bearings. A combination of crank and cam movement is employed to move the wheel into and out of the race. A crank moves the wheel forward from its back position and also moves the wheel into grinding position after the cam motion has traversed it into the race. Hydraulic power actuates these motions.

The work head is mechanically oscillated by means of a gear motor which drives an adjustable crank through V-belts. The shifting of belts and pulleys makes possible a wide range of oscillating speeds. This machine has all electric control, two selector switches being used. One makes possible three types of grinding cycle, the other three choices of coolant cycle. By combining these in various ways, nine separate operating cycles are available. Weight of the machine is 3,500 lb. and five electric motors are required to drive the different elements.

Developed particularly for grinding radial airplane engine cams, the 18-in. radial cam grinder also can be used for grinding other large loose cams such as diesel-engine cames which are ground before assembly on the camshaft. The bed roughly is L-shaped in front and is operated from within the L. Work speeds ranging from 2 to 12 r.p.m. may be secured. The work is held on an arbor by means of a removable washer and provision has been made for timing so that the cams will be ground in proper relation to their keyways.

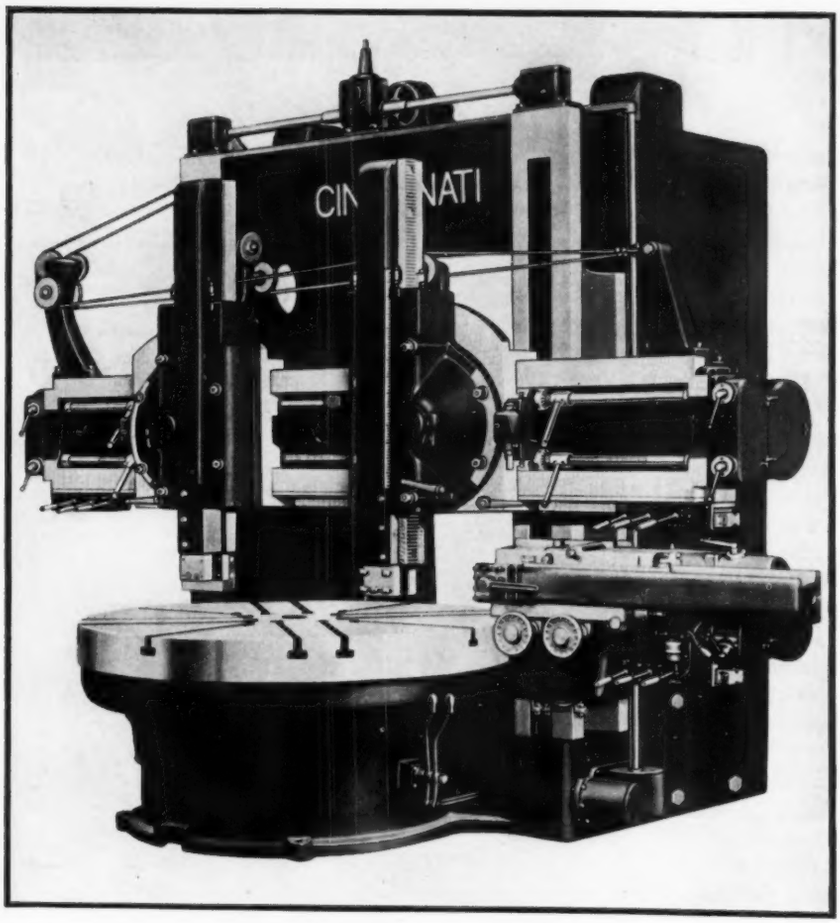
Headstock spindle assembly is carried by a swinging bracket mounted on tapered roller bearings. As the spindle assembly revolves, the master cam mounted on it is in contact with a cam roller at the rear of the main headstock casting. This roller gives a swinging motion to the work spindle assembly. The swinging ing bracket may be locked for cylindrical grinding.

The grinding wheel spindle is located within an octagonal slide. When the slide is positioned for the grinding of any particular cam it comes against a stop which locks it solidly in place. Axial adjustment makes it possible to set the wheel quickly and accurately.

The machine is equipped with handwheel feed only. One handwheel brings the wheel up to the work, while a second is a slow-feed handwheel which feeds the wheel during actual grinding. A third handwheel traverses the wheel from the intake to the exhaust side of the cam; the same handwheel traverses the grinding wheel during truing. The truing diamond is mounted permanently in a bar held by a bracket above the grinding wheel. Pushbuttons control the various motors. A water reservoir is integral with the real portion of the bed, a vertical individual motor-driven pump being used. Weight of the grinder is 7,000 lb.

Very small ball bearing raceways are ground to size automatically in the No. 1 "Race-A-Way" announced by Landis

Handwheels control feed and traverse motions of the grinding wheel on this 18-in. radial cam grinder



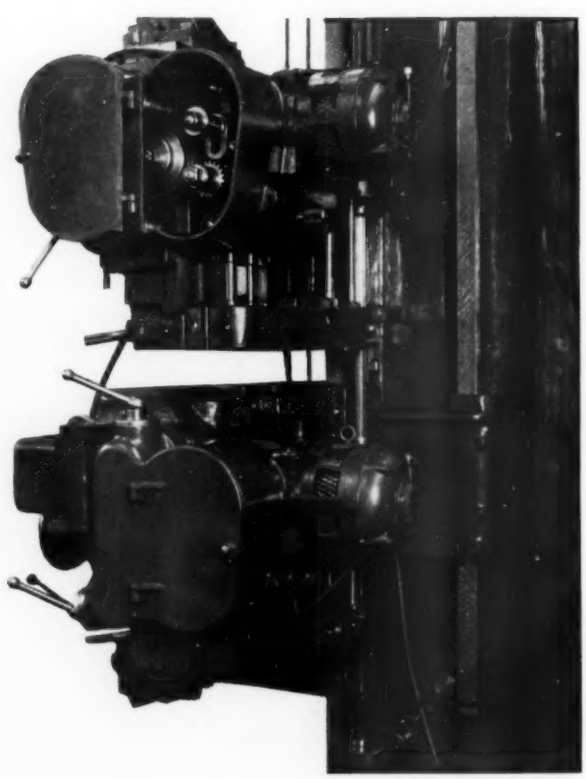
The improved 6-ft. "Hypro" boring mill is completely motorized and features Timken bearings in the table drive mechanism

Cincinnati "Hypro" Boring Mill Completely Motorized

A 6-ft. "Hypro" vertical boring mill has been announced by the Cincinnati Planer Co., Cincinnati, Ohio. This machine is completely motorized, individual motors for each unit eliminating any constantly operating mechanical units. All motors are idle except when used for moving the unit to which they are attached. This mill will swing 76 in. and is 60 in. high under the tool holders. It is equipped with two rail heads and one side head.

Each head is provided with twelve mechanical feed changes ranging from 1/96 to 0.80 in. Power rapid traverse of approximately 7 ft. per min. is provided for each head including the side head. A separate feed box for each head contains a complete feed, rapid traverse and reversing mechanism. The complete speed unit is inclosed and runs in a bath of oil supplied by a pump, built into each feed box.

The bed and speed box are of one-piece construction. A renewable conical track is furnished for the table bearing. All gears in the transmission are of heat-treated alloy steel forgings, and the drive is Timken-bearing mounted throughout.



Each head, including the side head, is provided with a separate motor for power rapid traverse. Separate feed boxes are totally inclosed

This mill is equipped with a variable speed d.c. motor drive, has four mechanical speed changes, and has a 30-hp. motor for the main drive, a 5-hp. motor for the elevating mechanism, a 1-hp. motor for the lubricating pump and a 1-hp. motor for the coolant pump. The range of table speeds is 1.3 to 50 r.p.m. The table drive motor is connected for dynamic braking and push-button control.

The cross rail is of box form and is provided with a long, narrow guide bearing on the bottom to insure alignment and prevent tilting of the head. This narrow guide section of the rail is solid and is claimed to be an improvement over the old style cored-out thin sections previously used. The rail is mechanically clamped to the housings and is operated manually at either end of the rail. Cross and down feeds for the rail heads are provided with ratchet handles, with micrometer dials located on the heads for fine adjustment. Hardened steel scales are provided on the cross rail and on all rams.

The rams are of box section and are made from Meehanite iron with a long bearing. Tool holders are made from solid steel forgings and are heat-treated. A dual counterbalance is furnished for the rams, so that special heavy tooling can be attached to one head without causing the other head to creep. Counterweights are carried inside the housings.

The side head is equipped with a support which distributes stresses over the entire housing. All heads and rams are provided with a centralized automatic lubrication system having a small pump located on each head and actuated every 6 in. movement of the rail or ram. Positive pressure lubrication is provided for the table track, transmission gears and bearings. The main drive motor is interlocked through an oil pressure switch with the oil-pump motor, making it impossible to run the table without sufficient lubricant pressure. This mill weighs approximately 69,000 lb. A 2-hp. motor is provided for each rail and side head for rapid traversing.

Roll Threader Announced by Acme Threads

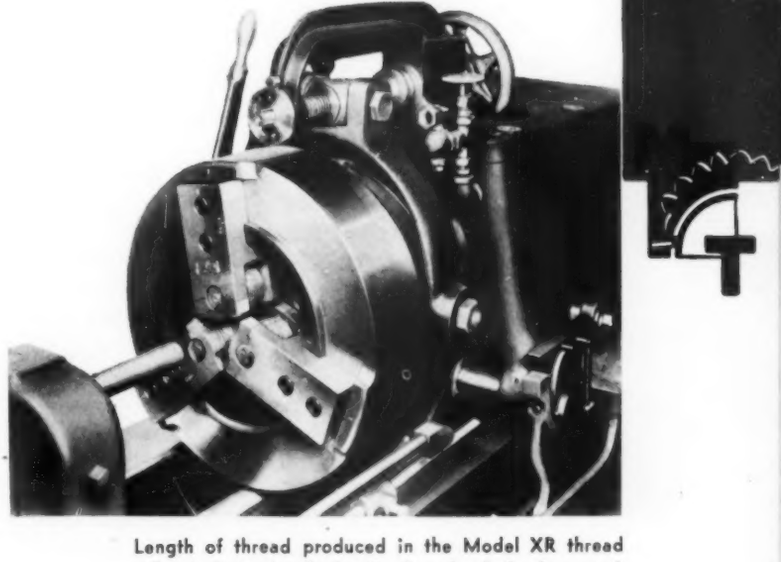
Bar Stock Without Limit to Length

A rolled thread in any length on bar stock up to 1½ in. diameter can be produced on the Model XR-roll threading machine offered by the Acme Machinery Co., 4533 St. Clair Ave., Cleveland, Ohio. The principle of this machine is entirely different from the conventional type of roll-threading equipment, in that the work is held stationary, while the die rolling head revolves, permitting the stock to lead through the die head. Only the length of the bar stock limits the length of the thread to be rolled.

The thread form produced is claimed to be extremely accurate, while pitch diameter and lead are held to close limits. The burnishing action of the rolls in forming the thread imparts a surface smoothness that has the appearance of a ground thread. This action also imparts a slight surface hardness to the thread being rolled and it is reported that strip tests show a 50 per cent increase in strength over a cut thread. Speed of rolling is somewhat higher than that of producing cut threads, amounting in some cases to 15 to 50 per cent higher, depending on the material and kind of thread.

Triple threads with ½ in. lead have been rolled successfully on stock less than ¾ in. in diameter.

In appearance the Model XR roll threading machine is similar to the Model XL thread cutting machine. The headstock is provided with an eight-speed gear box which is clutch controlled; gears and shafts are mounted on anti-friction bearings, and run in oil. The work-holding carriage is actuated by a double rack and pinion.



Length of thread produced in the Model XR thread roller is limited only by the length of the bar stock

The machine incorporates the micrometer feature of head adjustment for controlling pitch diameters without stopping rotation of the head. Drive is by multiple V-belts from a motor inclosed in the bed, with friction-clutch control for starting and stopping the spindle. Motor size on single-spindle machines having capacity up to 1½ in. diameter bar stock is 5 hp. Both single- and double-spindle types are available.

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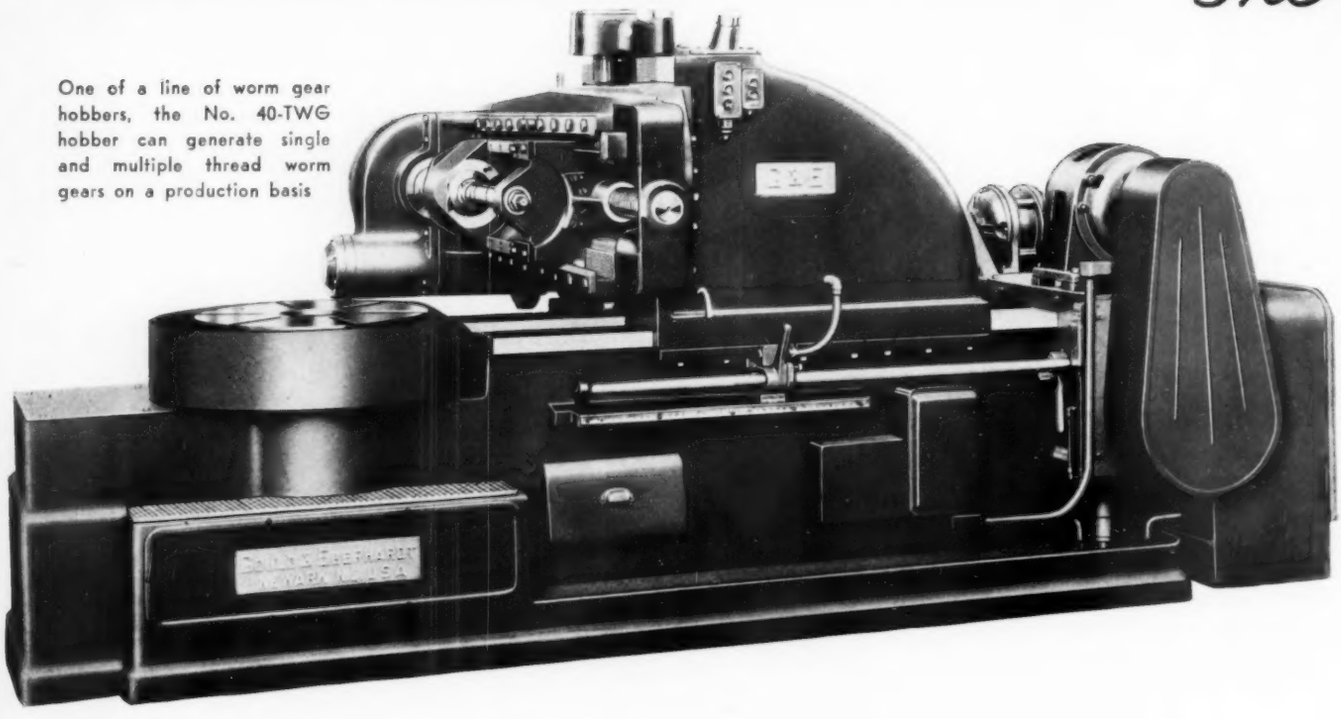


One of a line of worm gear hobbers, the No. 40-TWG hobber can generate single and multiple thread worm gears on a production basis

Gould & Eberhardt Hobbers Use Dual-Lead Worm Gearing

The No. 40-TWG one-gear hobbing machine developed by Gould & Eberhardt, Newark, N. J., is designed especially for generating single- and multiple-thread worm gears on a production basis. Arranged with both automatic infeed and tangential feed, this machine is intended for the exclusive production of worm gears with hobs or fly cutters. A diversified range of worm gears of ratios from 1 to 1½ up to 1 to 100 and greater can be produced.

The low stanchion carrying the hob slide is movable horizontally along the base of the machine to establish the proper center distance for the varying worm and worm gear diameters. Supported on wide flat base ways the stanchion is guided on the one side by a narrow square locked guide. An adjustable gib is provided to insure accurate alignment and a proper fit at all positions.

Worm gears, while being hobbed, are supported on the worktable which is fixedly located by a large tapered bearing directly within the main base. Special adjustment means are provided to maintain independently the diameter and end fits of the work spindle. Either adjustment is made without disturbing the setting of the other, or dismantling or refitting the table units.

Final drive to the work table is by a "dual lead worm gearing," in which the worm is arranged with a different lead on each set of profiles, thereby producing a thread that varies in thickness from one end of the worm to the other. By axially adjusting this dual lead worm the backlash is controlled without disturbing the center distance or affecting the transmission of uniform motion.

The tangential feeding head is adjustable vertically on the stanchion to permit setting the hob axis exactly in relation with the center of the worm gear face to be cut. The tangential head also may be adjusted angularly 5 deg. above and below its horizontal axis to compensate for the change in the hob diameters and lead angles that result from sharpening the hob. Tangential feed to the hob is available in either direction.

The infeed automatically is stopped by a cam that is adjustable for the center distance setting. A vernier, scale and magnifying glass aid in accurately setting the hob and worm gear blank to the correct center distance.

The hob spindle incorporates a departure from conventional designs in that a tapered bronze sleeve is shrunk on the heat-treated spindle to rotate within a stationary hardened bushing. This spindle is arranged with two independently adjustable means to maintain the diameter and end fits. Final drive to the hob spindle also is of the "dual lead type" worm and gear with facilities to adjust for backlash.

A dividing plate is located at the multiple splined end of the hob spindle for indexing multiple threaded hobs. A resetting device is incorporated for positioning the hob actually in proper registration with worm gears that are to be finished after having been roughed out on another machine or with a different set-up.

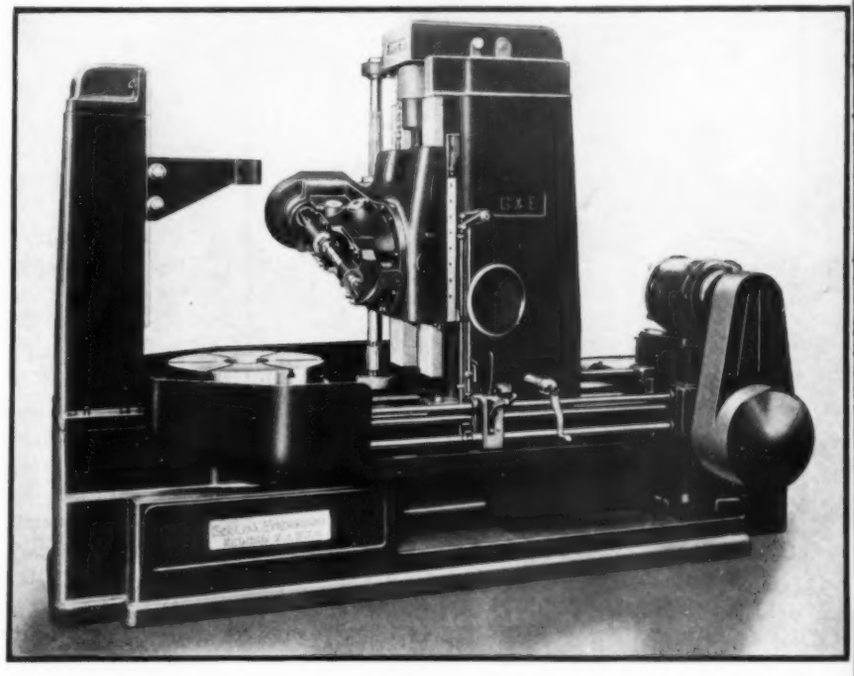
A quick-change feed case provides a selection of 32 feed changes for both tangential and infeed, arranged in two series and covering a wide range. Both tangential and infeeds may be changed while the machine is in operation. A circulating pressure system of lubrication automatically and continuously supplies oil to the mechanism in the main gear case, to the work spindle,

and to the index worm gear. A separate pump supplies coolant to the hob.

The No. 48-H gear hobber shown is one of the latest lines of Universal manufacturing type gear hobbers offered by Gould & Eberhardt. This line of hobbers has been redesigned and made heavier to meet increased production requirements. The outstanding development incorporated in this line of machines is the index worm and gear which is of the "dual lead worm gear" type. By axially adjusting this dual lead worm the backlash is controlled without disturbing the center distance or affecting the transmission of uniform motion. The entire drive to the hob spindle has been fitted with Timken roller bearings.

A swivel slide arranged with a worm and gear drive to the hob spindle has been developed for this line of machines. This provides a drive that is claimed to be particularly effective for the continuous production of coarse pitch gears of both the spur and the helical type. An overarm to the work support is now available and is beneficial when cutting spline shafts and long pinions of wide face.

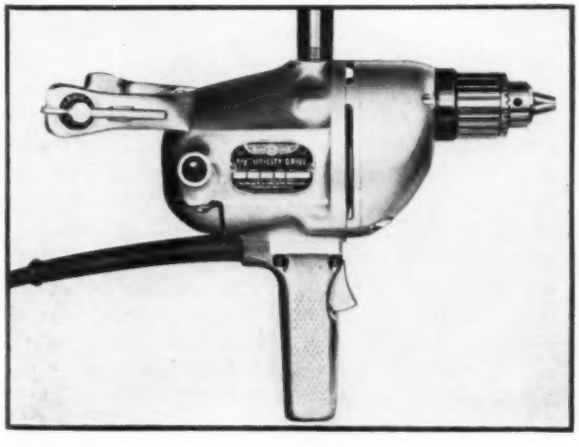
A worm-gear cutting attachment for the larger machines has been developed for hobbing single and multiple thread worm gears, using hobs or fly cutters. A hand indexing device may be furnished for cutting spur gears with regular form cutters. A similar attachment is available on the larger machines for cutting both spur and helical gears with form cutters. An internal gear cutting attachment used in conjunction with the hand indexing for spur gears also is available for the larger machines.



The No. 48-H Universal gear hobber has been redesigned to meet greater production requirements

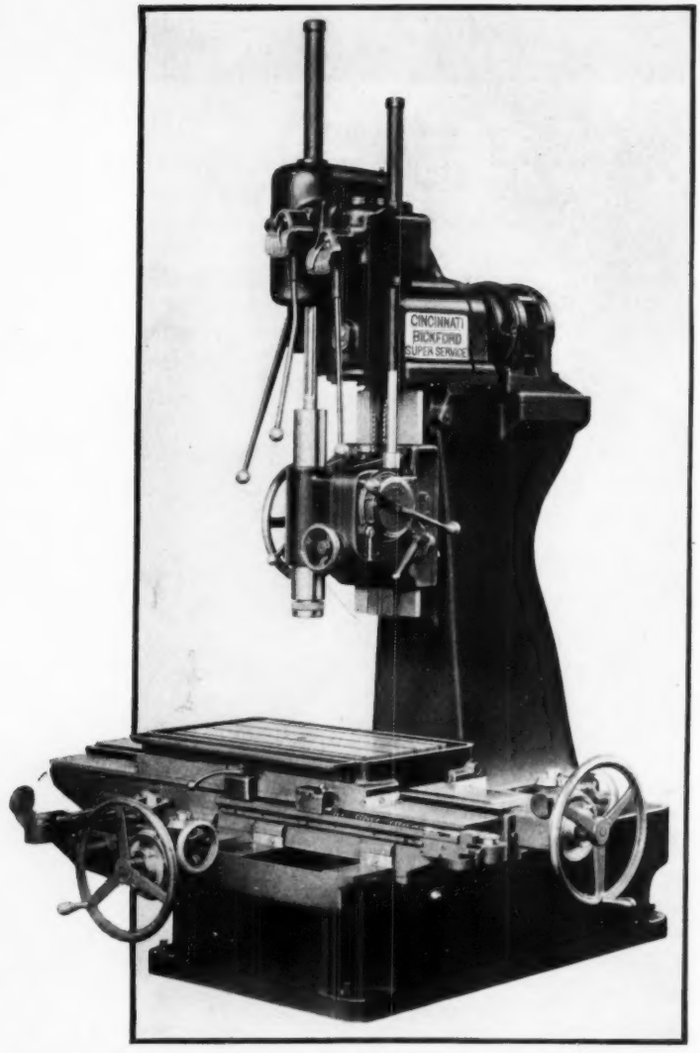
Black & Decker Offers Lighter Portable Drills

Five portable electric drills, of which this ½-in. capacity model is one, have been improved by Black & Decker



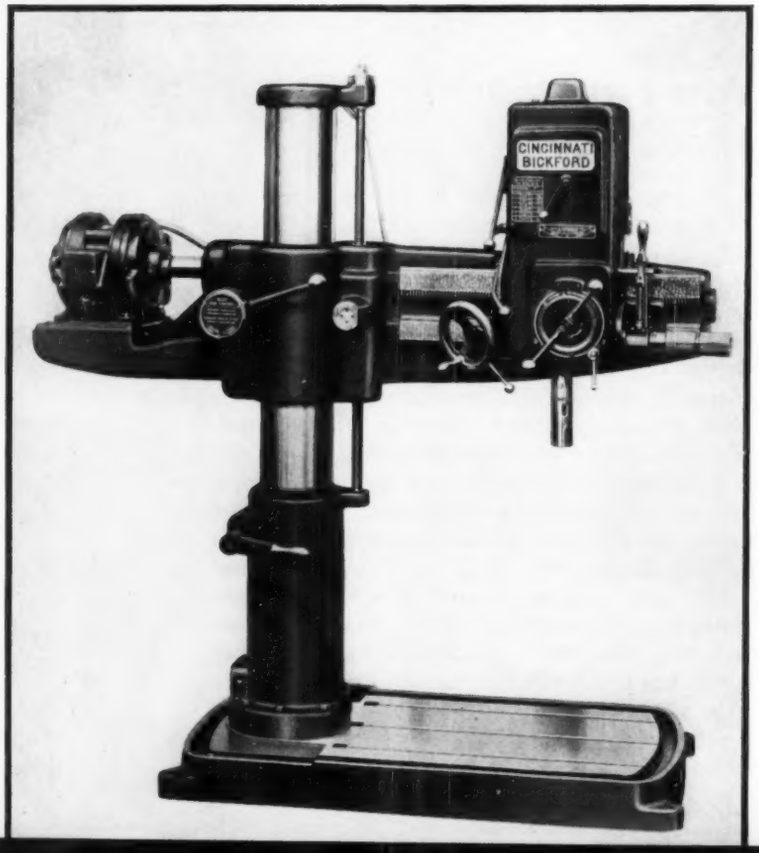
Redesign of five portable electric drills has been announced by the Black & Decker Mfg. Co., Towson, Md. These drills are the ½-in. Utility, ⅜-in. Heavy-Duty, ⅜-in. Utility, 5/16-in. Heavy-Duty, and ¼-in. Heavy-Duty. These improved drills are all shorter in length and lighter in weight than their predecessors, and on each the spindle offset has been reduced to a minimum. Their design now incorporates threaded chuck mounting, splined mounting for the spindle gear, and removable commutator covers.

The ½-in. capacity "Utility" drill shown is equipped with an instant release trigger switch, with a switch locking pin for optional use on continuous operation. Capacity of this drill is ½ in. and 1 in. in hardwood. Spindle speed at no load is 400 r.p.m. and 300 r.p.m. at full load. Net weight is 10¾ lb., and overall length, including spade handle and chuck, is 13¾ in. A three-jaw Jacobs geared chuck is standard.



Twelve spindle speeds and nine rates of power feed are provided in this jig borer

This 7½-in. column, 2½-ft. radial drill has several optional spindle speed ranges



The

Single Lever Controls Speeds On "Super Service" Jig Borer

The Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio, has announced the development of a "Super Service" jig boring machine having twelve spindle speeds effected through sliding gears and controlled by a single direct-reading lever. It has a 3-hp. driving motor and nine rates of power feed. These range from 0.002 to 0.20 in. per revolution of the spindle and are controlled by a single direct-reading lever. Direction of feed can be reversed instantly without changing the direction of spindle rotation.

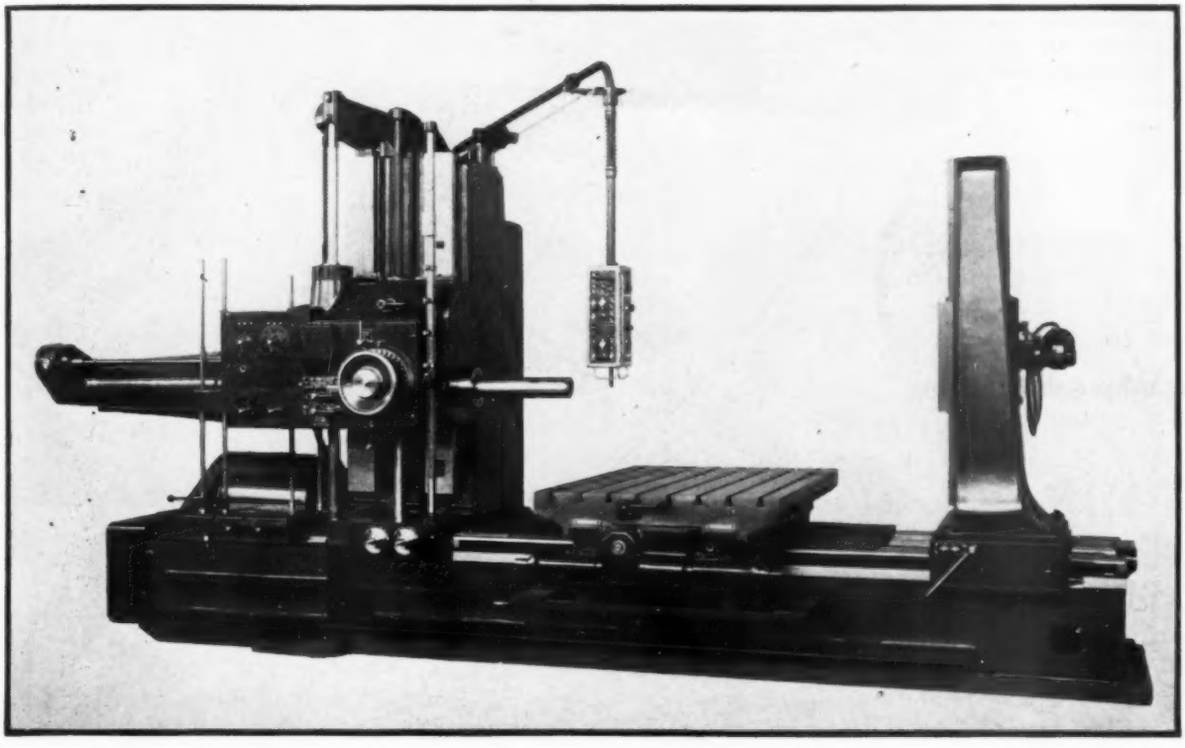
A feature of this machine is the use of broad bearing surfaces and long narrow guides for the table, saddle and sliding head. The saddle is mounted with a taper gibbed narrow guide 38 in. long. The table never overhangs the saddle, nor does the saddle at its extreme position overhang the bed.

Screws for moving the saddle and table are hardened and ground, and each is fitted with an 8-in. diameter dial graduated in thousandths. One turn of the dial equals 0.200 in. movement. There also is a fine adjustment wheel geared to each of the larger dials, facilitating precise table positioning. Standard gage rods and dial indicators are required only for work of extreme accuracy. The sliding head and the spindle are balanced with separate counterweights.

A new 2½-ft. high-speed "Super-Service" radial drill also is offered. Developed especially for operations requiring small drills and taps in fairly large parts, this machine can be equipped with automatic tapping control. When using a constant speed motor, three changes of spindle speed are provided by the geared head. Six spindle speeds can be obtained by using a two-speed a.c. motor. The two-speed motor is controlled by a convenient fast-slow-stop switch mounted at the right of the head. Three rates of power feed of 0.003, 0.006 and 0.009 in. per rev. of the spindle are obtained by setting the direct reading lever at the center of the head. Power feed is engaged by the quick-return levers directly above the spindle.

Precision anti-friction bearings take both the thrust and radial loads on the spindle. Feed rack is an integral part of the spindle sleeve, and both spindle and sleeve are counterweighted. Power elevation of the arm is standard and the elevating screw is supported at both top and bottom. Spindle control lever for forward-stop-reverse is located at the lower left-side of the head. This lever operates built-in push buttons controlling the 1-hp. reversing motor. The driving motor has been mounted on the arm to provide better balance for the head and to promote ease of handling. Head is mounted on ball bearing rollers and is moved at the rate of 3 in. per turn of the handwheel.

Large Lucas Horizontal Boring Machine Has Multi-Position Pendant Directional Control



Multi-position directional control is incorporated in the pendant station of the No. 548 boring machine offered by Lucas. This unit controls spindle rotation and traverse of all sliding units, including the spindle

Multi-position, electric pendant directional control is provided for spindle rotation and traverse of all sliding units, including the spindle, in the large No. 548 and No. 560 horizontal boring, drilling and milling machines made by the Lucas Machine Tool Co., 523 E. 99th St., Cleveland, Ohio. "Hi-Lo" dual control is provided at the head or bed level for shifting gears in the speed and milling feed change gear boxes located on the bed, where there is ample room for a generous size mechanism and its weight does not have to be counterbalanced.

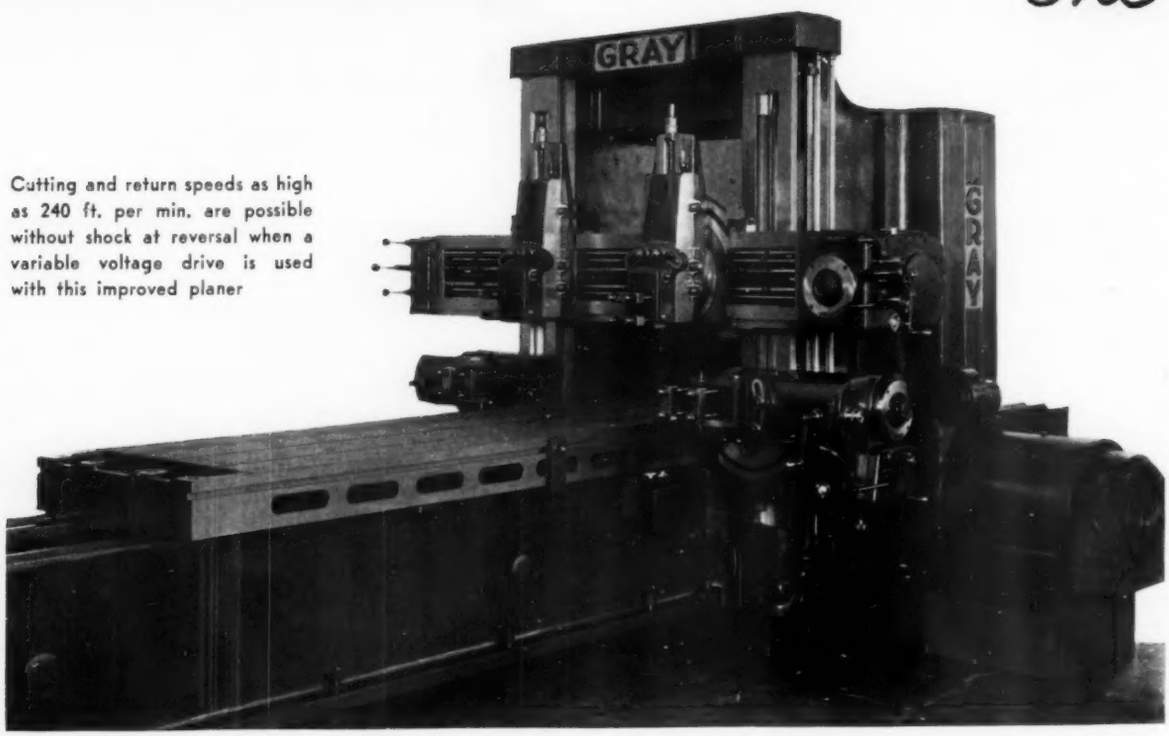
This leaves room in the head for final driving gears of large diameter for slow-speed high-power drives. The fast speeds are transmitted by multiple V-belts to the 5-in. diameter main spindle. The spindle has a 60-in. continuous traverse by means of a lead screw, which permits provisions for thread leads for screw cutting if desired. Spindle feeds are taken off the spindle sleeve, so are not affected in rate per revolution by spindle speed changes. All gears run in oil.

A large dial with numbered graduations on the front of the head indicates directly the distance the spindle extends beyond the faceplate, serving as a depth gage for the full 60-in. traverse of the spindle. An adjacent dial can be set to trip out the spindle feed automatically at any desired position within its full range of traverse.

All motions have power rapid traverse, as well as feed, and are provided with the electric limit switches. The table has a so-called "jump feed" crosswise, adjustable trips serving automatically to feed and rapid traverse alternately, thereby expediting the milling of interrupted surfaces, such as spaced pads. Pre-selection of traverse facilitate milling around rectangular edges by instantly shifting from table cross feed to head vertical feed and vice versa.

Because of the weight of the backrest, an individual motor with directional push-button control is installed on the base for traversing longitudinally along the bed. When the backrest base is clamped to the bed, the clamp lever covers the control buttons, so that the traverse motor cannot be operated.

The backrest block is clamped in the desired vertical position by means of a torque motor automatically operated by remote control simultaneously with the head clamps interlocked with the vertical feed. The saddle clamps are interlocked likewise with the power motion.



Cutting and return speeds as high as 240 ft. per min. are possible without shock at reversal when a variable voltage drive is used with this improved planer

Closer Control and Higher Speeds Available in Gray "Maximum Service" Planer

The improved "maximum service" planer developed by the G. A. Gray Co., 3611 Woodburn Ave., Cincinnati, Ohio, features improvements in control and drive. The control levers for feed and rapid traverse are located at both ends of the rail, as well as at the heads themselves. Consequently, they can be engaged or disengaged from any operating position.

With the exception of the motors themselves all rail elevating and rapid traverse parts on the top brace are fully inclosed. The power traverse and elevating gears run in a bath of oil. A one-shot oiler supplies oil to all other parts on the top brace that are not lubricated by the splash system.

The housings have been made deeper and widened at the rear to form a well that incloses the over-size counterweight. In the design of the new housing, the wall between the housing body proper and the counterweight was retained, as were all other stiffening walls and braces in the housing body so that this structure now not only eliminates the counterweight braces, cables and weights, but also stiffens the housings in both directions. This is particularly important when doing heavy roughing on high work.

The all-helical gear train makes it possible to utilize to the fullest extent the rapidity of reversal made possible by the variable voltage drives now available. A variable voltage drive in conjunction with a 5 to 1 all-helical gear train affords both cutting and return speeds ranging from 8 to 240 ft. per min. As many as 50 round trips per minute of the table can be made.

Cleereman Jig Borer Has Twelve Spindle Speeds

Twelve spindle speeds in a ratio of 20 to 1 are available in the jig borer announced by the Cleereman Machine Tool Co. of Green Bay, Wis. These speeds may be had in either of two ranges and, when a wider range of speed is desired, a two-speed motor may be used to obtain a ratio of 40 to 1. All gears in the spindle drive are hardened and the teeth are ground to precision limits. All shafts are multi-splined and are mounted on ball bearings. Gears in the feed box are of the sliding selective type and are mounted on multi-splined shafts.

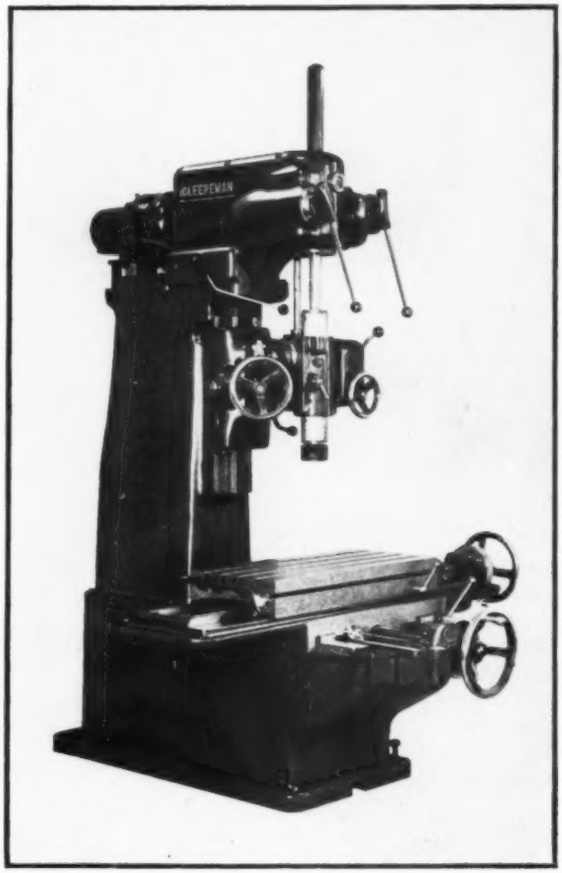
Convenient grouping of control levers, single lever selectors for speeds and feeds, and ease of operation are featured in this machine. It has power rapid traverse in both directions of table feed. Other features are precision lead screws, spindle depth gage and a micromatic sliding head gage stop. End measuring rods can be used for close setting of the table.

Direction of rotation of the spindle is controlled electrically by means of a reversing motor. The spindle is stopped automatically by a brake mounted on the motor. Starting the motor in either direction automatically releases this brake, while shutting off the motor automatically shuts the brake and stops the spindle. The brake also locks the spindle for making tool changes.

Double box-section construction of the spindle head is claimed to insure rigidity of this member. The head is counterbalanced, and a single lever locks the head accurately to the column. The length of the quill bearing in the spindle head is three times the diameter, thereby eliminating spindle wander. The spindle head also contains the feed worm, worm gear and feed-depth gage. Speed gear and worm are in constant mesh and operate in a bath of oil.

In so far as possible, all units of the jig borer are lubricated from a central reservoir by means of a Bijur system. The transmission head has a reservoir carrying approximately five quarts of oil. A pump circulates the oil, lifting it to the top of the head and distributing it by means of tubes throughout the entire gear box.

The jig borer is offered with a choice of either or both of the two types of measuring instruments in common use: precision, hardened and ground lead screws; or end measuring rods. It may be equipped with power rapid traverse to the table and carriage by means of built-in motors which drive the lead screws through worm gearing. This machine is distributed in the United States by the Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill.



Convenience of operation is featured in the Cleereman jig borer now available

"Gyro-Stat" Oil Seal Serviceable at All Machine Speeds

The "Gyro-Stat" oil seal employs a two-part frustro-conical unit and seals with an oil film at a substantial right angle to the center line of the shaft

The "Gyro-Stat" oil seal developed by the Oil Seal Div., American Felt Co., 315 Fourth Ave., New York, N. Y., provides a totally inclosed and protected sealing area within itself, thus requiring no special finishing of shafting. It is serviceable at all rotative speeds and temperatures usually encountered in modern machinery. The seal not only will retain bearing lubricants, but will also exclude coolants, grinding compounds and cuttings from the bearing area. These seals now are available in $\frac{1}{8}$ in. steps from $\frac{1}{2}$ to 3 in. shaft diameters, inclusive. In all cases, the outside diameter of the seal units have a standard fractional hole dimension. Widths are equal to or less than ordinary ring-type closures. Installation can be accomplished with simple pressing fixtures; there are no lips or delicate leading edges which must be handled carefully, as a direct metal-to-metal annular fit is available for both the outside and the inside diameter. Due to the flexing frustro-conical co-action of the two sealing members, axial thrust and eccentric shaft movement have no effect on sealing action.

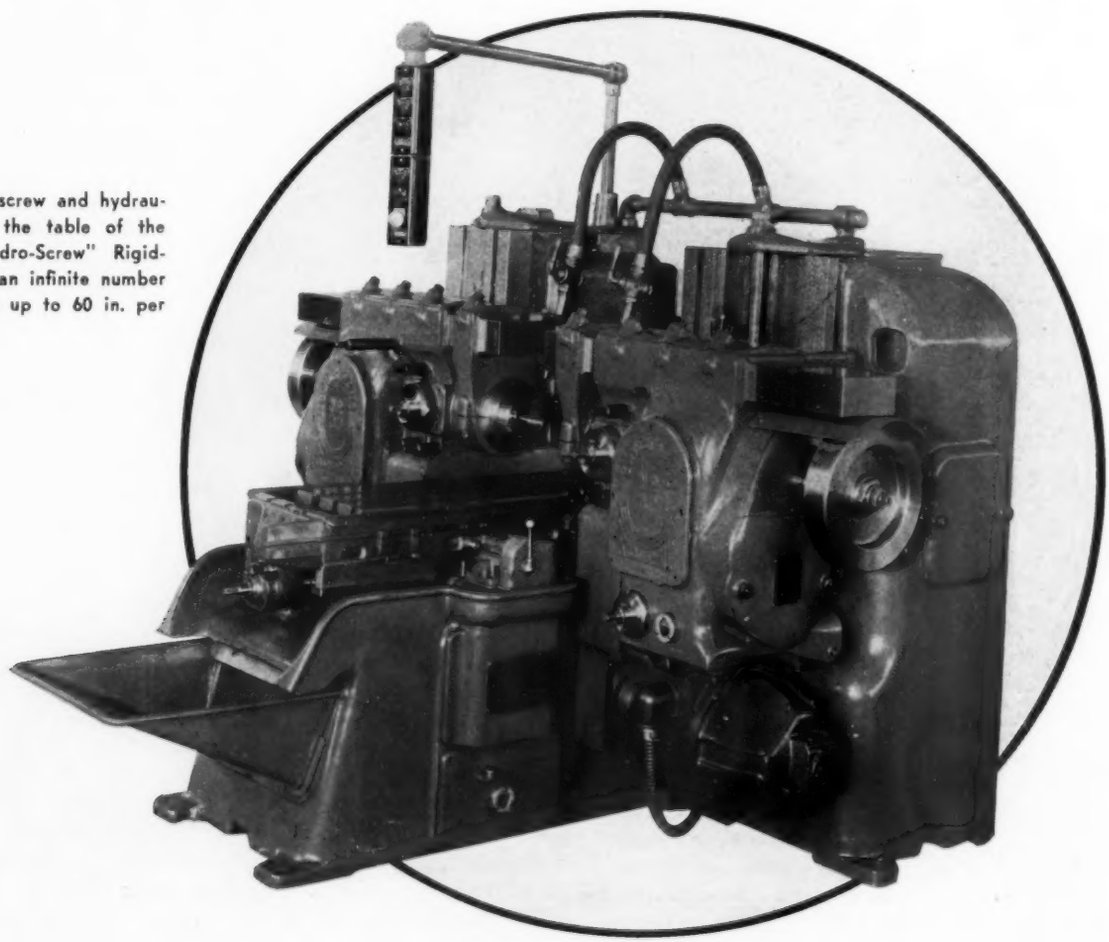
The

Rockford "Hydro-Screw" Rigidmil Used for Climb or Conventional Cutting

The No. 33 "Hydro-screw" Rigidmil for climb or conventional milling announced by Sundstrand Machine Tool Co., Harrison and 11th Sts., Rockford, Ill., has a combination of screw and hydraulic drive to the table. This machine has a table screw driven by a hydraulic transmission which provides an infinite number of feeds within the range at ½ to 60 in. per min., and a rapid traverse rate of 300 in. per min. Having an efficient anti-backlash nut, the machine can be used successfully for climb or conventional milling. The variety of table cycles available includes skip feed in both directions, reverse from feed to feed, and a different rate of feed in opposite directions of the machine table in the same cycle. In addition, the hydraulic transmission has an acceleration and deceleration which provides a shockless start and stop to the table.

Being assembled of standard units, this Rigidmil has practically no confining limits. It can be built with 120 in. feed stroke or longer to suit special requirements. Applications can be made of single-spindle, multiple-spindle, horizontal or vertical heads in almost any combination. The spindle head on the standard machine has a 30 to 1 ratio drive and is available in three different speed combinations. There are 48 changes of gears available within these ranges and four sets of pick-off gears, sufficient for 16 different spindle speeds, furnished as standard equipment. The heads are independently motor driven, which gives the full capacity of the motor at the spindle nose less slight frictional losses. Dual control of the table movements is standard equipment.

The No. 00 hydraulic feed Rigidmil also offered provides a feed rate variable indefinitely within the range of ½ to 37 in. per min. by simply turning a calibrated feed selector dial on the front of the machine. A rapid traverse rate of 400 in. per min. is provided. These machines are furnished in two sizes, one having 8 in. maximum feed stroke and the other 12 in. maximum stroke. On either machine, the length of stroke can be adjusted to suit requirements within the maximum stroke. The use of hydraulic



A combined screw and hydraulic drive to the table of the No. 33 "Hydro-Screw" Rigidmil provides an infinite number of feed rates up to 60 in. per min.

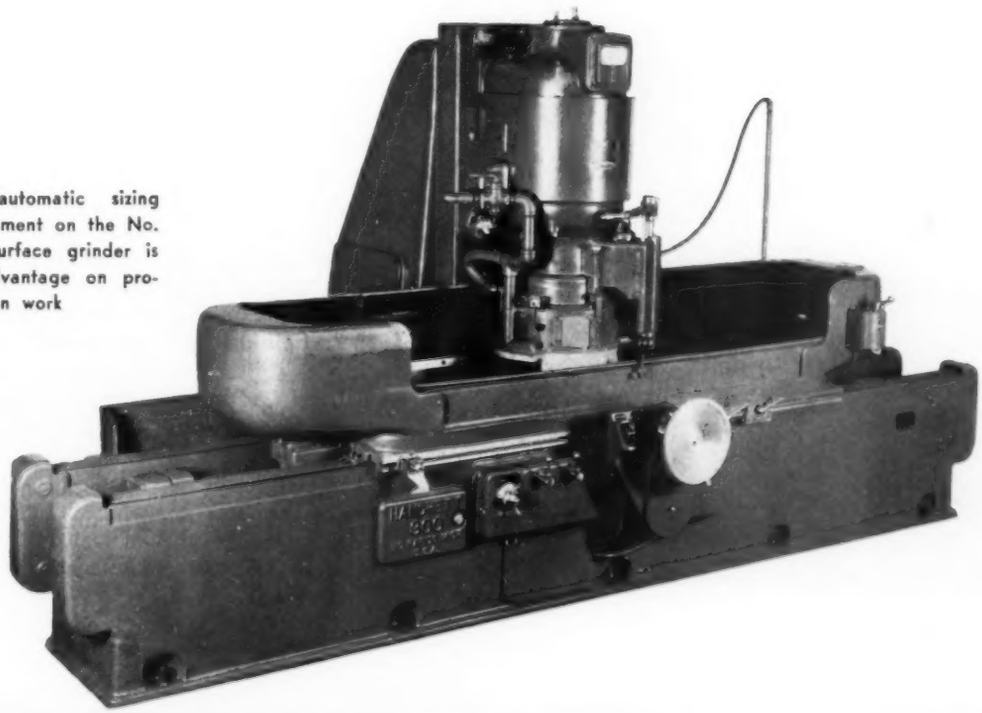
feed makes possible a wide range of table cycles including two-way cycles and skip feed with either climb or conventional milling. The head has a high spindle speed ratio of 42½ to 1, which makes possible the milling of many different kinds of metals without sacrifice in production. The head can be furnished in either of two speed ranges, and there are 64 possible speed changes for each type. Four sets of pick-off gears are furnished with each machine to provide 16 different spindle speeds. The head has a separate drive motor. Automatic lubrication is provided for all moving parts.

Improved Hanchett Surface and Disk Grinders Available for Wide Range of Work

The No. 214 double-spindle disk grinder announced by Hanchett Manufacturing Co., Big Rapids, Mich., features a separate 3-hp. motor on each spindle. Disk-type 14-in. diameter grinding wheels are used. A rotary-type work fixture is incorporated in the design so that small parts having two opposite parallel surfaces can be finished rapidly. The fixture can be arranged for different parts by changing the shape of the locating positions on the periphery of the rotating fixture.

Improvements in the No. 300 reciprocating vertical-spindle surface grinder and the No. 36 rotary vertical spindle surface grinder make these machines easily adaptable for both production and toolroom grinding operations. A 30-hp. motor now is used on the grinding wheel spindle of the No. 36 grinder previously described (*AM*—Vol. 82, page 942). This machine also has been arranged to take a 40-in. diameter magnetic chuck. Also, a Bijur one-shot lubricating system has been provided for both the grinding wheel head slide and the table slide. A 25-hp. motor drives the spindle of the No. 300 grinder, which has a 13- x 50-in. table. This grinder is used for both production and toolroom work, the special automatic sizing attachment being of particular advantage on production work.

The No. 214 double-spindle disk grinder is designed especially for small parts having two opposite parallel surfaces to be finished



An automatic sizing attachment on the No. 300 surface grinder is of advantage on production work

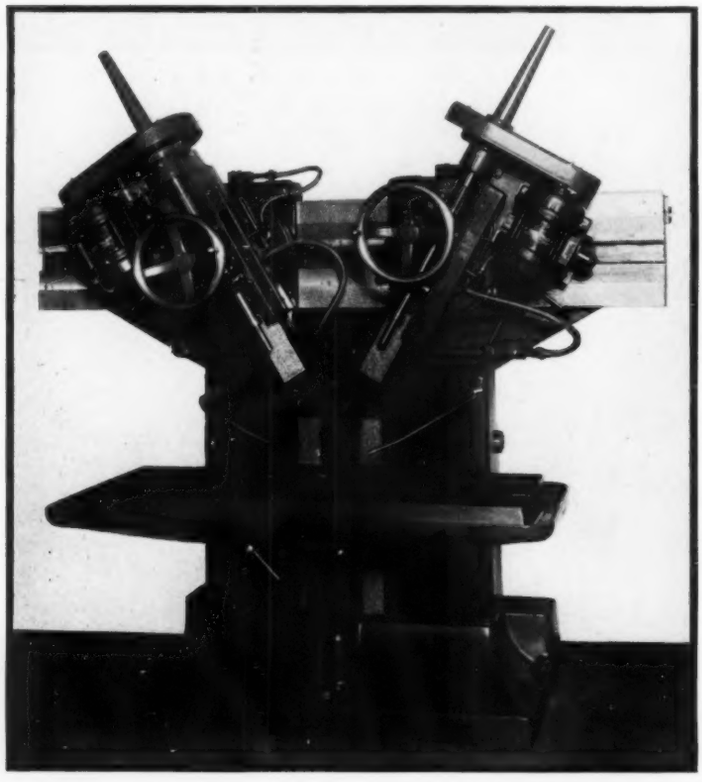
Hydraulic Feeds Featured in New Leland-Gifford Drilling Machines

A rail-type drilling machine, in which the spindles have both angular and longitudinal adjustment, is manufactured by the Leland-Gifford Co., Worcester, Mass. In this machine, hydraulic feed drilling units are mounted on saddles and are driven by single-speed motors through V-belts. This provides either step-by-step feed for drilling long holes, such as oil holes in crankshafts, or the regular standard-type hydraulic feed.

The saddles on which the drilling units are mounted are carried on ball bearing rollers, which run on a hardened and ground steel track and are kept in alignment by a bearing on a dovetail slide. The spindles have a No. 2 Morse Taper. They can be tilted up to 45 deg. at either side of the vertical, and can be adjusted as to centers from 15½ to 73 in. when in a vertical position.

Interchangeable locating bars are furnished for locating the heads in selected positions on the rail, making this machine suitable for drilling operations where production is small and the machine must be flexible, or where the shafts are large and not easily handled between operations, making it more economical to change the set-up on the one machine.

Hydraulic-feed drilling units are adjustably mounted on this rail-type drilling machine announced by Leland-Gifford



Two types of hydraulic table feed are available for this multiple-spindle drilling machine

All controls and adjustments for this rail-type drilling machine are located on the front of the machine within easy reach of the operator. Where desired, the machine can be furnished with one head only, or with hand feed to the spindle in place of the hydraulic feed.

The multiple-spindle adjustable-spindle drilling machine features hand-controlled hydraulic feed. This feed requires only finger-tip pressure on the feed lever, and the table follows exactly the motion of the hand, both as regards height and speed of travel. As the hydraulic action from the feed lever is "dead beat" there is no motion to the table when the feed lever motion is stopped.

In addition to the hand-controlled hydraulic feed, which can be entirely disconnected, a conventional type hydraulic feed is available for actuating the movement of the table. This consists of a single cycle of

rapid approach to drilling position, a drilling feed and a rapid return. When the operator keeps his foot on the treadle, this can become an automatic cycle. Rates of feed for drilling are from ½ to 150 in. per min. with a fast approach of 240 in. per min.

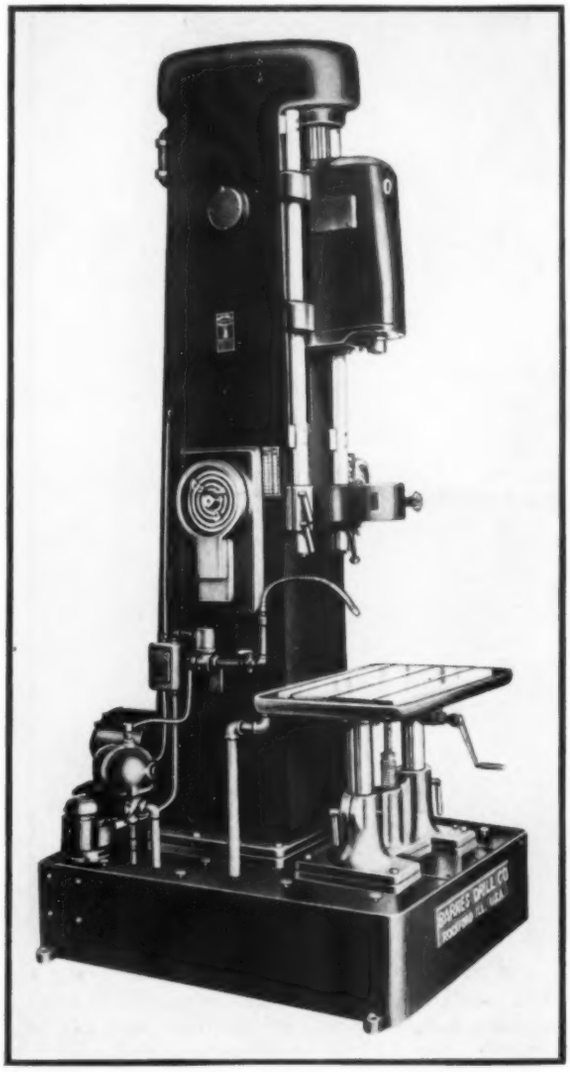
Universal joints, available for this machine, are lubricated automatically from the oil reservoir in the head. The machine is direct motor-driven from a totally-inclosed, fan-cooled four-speed motor which, in conjunction with a two-speed gear ratio to the spindle, provides eight spindle speeds ranging from 830 to 4,500 r.p.m. The machine is built in three sizes, having 12, 16 and 24 spindles, respectively, and can be furnished with ⅜-, ½- and ⅝-in. spindles.

Barnes Self-Oiling Honing Machine Has an Aluminum Reciprocating Head

The aluminum reciprocating head on the No. 224 self-oiling single-spindle honing machine developed by Barnes Drill Co., 830 Chestnut St., Rockford, Ill., can be geared for a single desired speed, or provided with a four-speed quick-change transmission. The spindle is reciprocated hydraulically with a standard spindle travel of 16 in. A 24-in. spindle stroke may be supplied with the standard aluminum head shown, or spindle travel may be as much as 40 in. on special order. Interrupted bores and cylinders having ports and small openings in the walls often may be successfully honed in this machine. Cylinders and bores ranging from ¾ to 4 in. in diameter may be honed with this machine.

For quantity production honing, an electrically controlled stroke timer can be incorporated in this machine. This device, under push-button, provides automatic quick approach into work, automatic and instantaneous assumption of the honing stroke, predetermines the number of cycles of operation by the element of elapsed time for the honing cycle, and then the control automatically lifts out the hone and stops it in the uppermost position. Cycles of reciprocation on this machine may be changed to suit the nature of the work while the unit is running, by means of a volume regulator control. Length of stroke may be set by means of quickly adjustable stops mounted on circular T-slots, while overrun of the hone at each end of the cylinder is controlled accurately. A stroke control lever may be used at the will of the operator for short stroking to remove taper or to make any desired correction in the cylinder.

The standard No. 224 honer has an extreme height of 123 in., with a distance from the center of the spindle to the face of the column of 11¼ in. The rectangular table measures 17 x 28 in., while the indexing table measures 15 x 36 in. When constructed for single-speed operation, the spindle may be run at any desired speed from 150 to 800 r.p.m. When the four-speed transmission is used in the reciprocating head, speeds of 150, 250, 400 and 600 r.p.m. are provided. The machine occupies a floor space measuring 62 x 40 in., and weighs 4,000 lb. when equipped with motor and starter, and independent rectangular table.



An efficient hydraulic system is built into the base of the No. 224 single-spindle honer. Special holding fixtures can be mounted easily

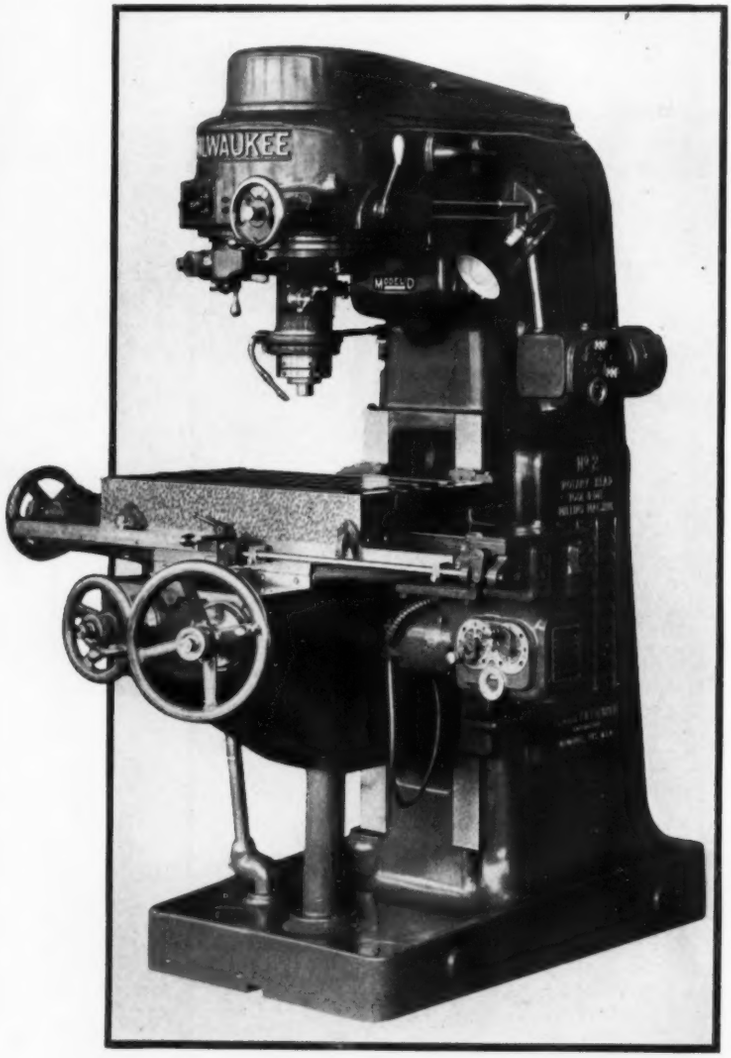
The

Milwaukee Rotary-Head Miller Completes Dies at One Set Up

The primary advantage of the rotary head tool and die milling machine announced by Kearney & Trecker Corp., Milwaukee, Wis., is its ability to complete dies at one set up. All layout work, milling, drilling, boring and slotting operations can be completed without resetting the die, resulting both in saving of time and increasing the accuracy of the die. The rotary head might be compared to a rotary table held in an inverted position and having mounted in it a spindle which can be set off center radially and rotated in a planetary motion.

In this machine, the vertical spindle is mounted on cross slides and can be offset accurately by means of a precision-ground screw and micrometer dial. Both the tool spindle and the rotary head are driven by individual motors. Each can be revolved in either direction independently of the other. The rotary head can be revolved either by hand or power through 360 deg. or any part of a circle. It has sixteen feed changes, ranging from 1/5 to 3 r.p.m. The periphery of the rotary head has a T-slot in which trip dogs are set, permitting automatic feed throwout at any point of the rotary travel. The head is graduated in degrees and its handwheel dial is graduated in minutes. The handwheel can be removed to permit mounting index plates.

A cherrying attachment can be mounted directly on the rotary head to tie together cross-slide and vertical spindle motions



The K & T rotary head tool and die miller incorporates a vertical spindle mounted on cross-slides which can be offset accurately. Both the spindle and the rotary head can be revolved in either direction independently of each other

The radially offset limits of the spindle on its cross slide are from 0 to 4 in. in radius. Cross-slide construction is such that the spindle can be set at dead zero by inserting a 1 in. measuring block between two hardened pads. The spindle is mounted in a quill having 3 in. vertical movement, either power or hand operated. Hand adjustment is in thousandths of an inch, as indicated by a micrometer dial. The vertical power feed has eight feed changes ranging from 0.0002 to 0.008 in. per revolution. Spindle speeds range from 250 to 6,000 r.p.m. There are an infinite number of spindle-speed changes.

The large vertical power feed range of from 0.0002 to 0.008 in. per revolution permits precision boring within the 3 in. of vertical movement. Power boring is possible in both directions, making it possible to bore down and return, thereby relieving the cut. Cutters as small as 0.014 in. diameter have been used.

Due to the combination of a comparatively small

All controls are conveniently placed on the head or knee. The spindle has vertical power feed

table, supported by a saddle longer than the table movement, and a rigid knee, the machine provides the combination of accuracy and sensitivity of operation necessary for tool work with the strength for maintaining this accuracy. Precision-ground cross, longitudinal and vertical screws are used for the table, the longitudinal- and cross-movement screws being equipped with adjustable nuts for eliminating backlash. Clutches are provided on all handwheels to remove the possibility of accidentally disturbing the set-up. Large 5 in. diameter micrometer dials permit accurate setting of all table movements. The table measures 30x16 in. and is provided with regulation T-slot troughs and coolant return. Tolerances of 0.001 in. are obtainable directly from dial settings. Should greater accuracy be desired, there is available a dial indicator set, including micrometer rods, troughs and built-in indicators reading in 0.0001 in.

The cherrying attachment is mounted directly on the rotary head and ties together the cross-slide motion of the spindle with the vertical motion of the spindle, permitting circular movements of the cutter in a vertical plane. The diameter of the cherrying cut can be set accurately in thousandths of an inch. In addition, there are adjustable stops for limiting the cherrying movement through any desired arc. Another feature of the cherrying attachment is that any angle from 0 to 360 deg. can be milled. Combining the rotary head motion with the angular ability of the cherrying attachment will permit the generation of conical cavities and projections.

Slotting, right-angle milling, and universal angle milling are possible through attachments designed for these operations. In setting up a die, the centerline method is used in locating it on the machine table. The cross and longitudinal feed dials are set at 0 on this centerline, thus establishing a common base line from which all dimensions and movements are taken.

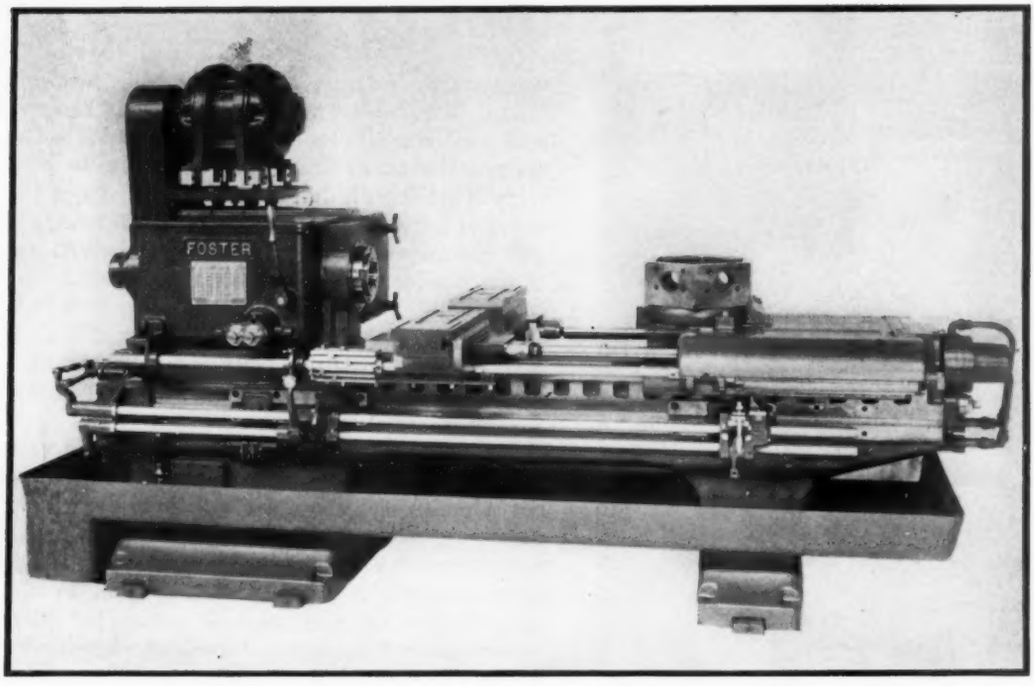
Sundstrand Oil-Power Transmission for Speed or Feed Drives

A 2-hp. oil-power variable-speed transmission has been developed by the Pump Div., Sundstrand Machine Tool Co., Rockford, Ill., especially for machine tool applications. It provides a speed range steplessly variable from 10 to 3,000 r.p.m. and is suitable for either speed or feed drives. This transmission incorporates a multiple piston pump mounted below an oil-power fluid motor of the same type. This arrangement takes less space than putting the motor and pump in line as in the conventional hydraulic transmission. Controls are simple and flexible.

Features claimed for this transmission are high overall efficiency with high starting torque at low speeds. No valves are used in reversing and there are no rotary valves. Pump and motor valves operate at only 1/20 the surface speed of rotary valves. Either mechanical, hydraulic or electric controls can be used.

A steplessly variable speed range of 10-3000 r.p.m. is provided with this 2-hp. variable-speed transmission

The



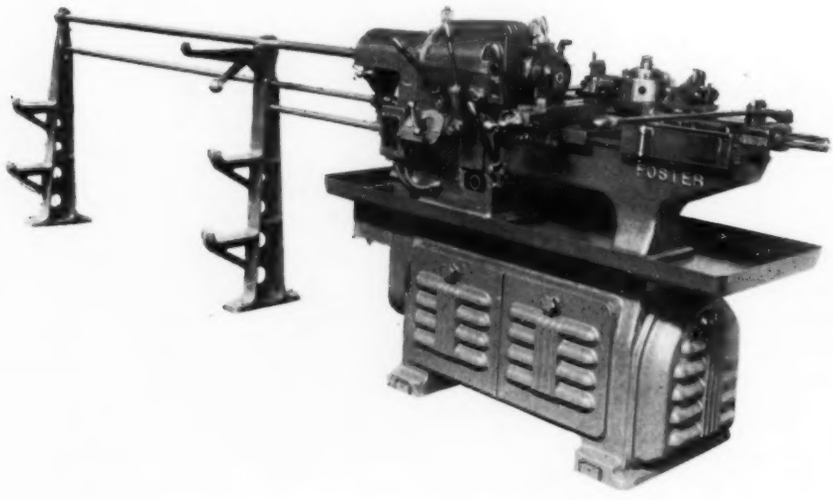
A simple and convenient method of selecting automatic spindle speed changes is featured on the No. 2-F "Fastermatic" automatic turret lathe

Foster Turret Lathes and Superfinishers Arranged to Reduce Set-Up Time

Reduction in set-up time is the principal advantage claimed for the No. 2-F "Fastermatic" automatic turret lathe offered by the Foster Machine Co., Elkhart, Ind. The heads regularly have 28 speed changes, from 17 to 260 r.p.m., or higher if necessary; these are arranged in seven sets of four automatic changes. Any group of four automatic changes may be quickly selected by the application of the proper set of pick-up gears.

There is a station on the spool for each tool station of the hexagon turret. The spool indexes with the indexing of the turret, bringing a separate station with a separate set of buttons in position to effect the automatic spindle speed changes predetermined for that working face of the turret.

The number of automatic changes to a single face of the turret, when traveling forward, is determined by the number of buttons on the spool and the longitudinal positions of the buttons on the spool determined when the spindle speed changes will be effected. These changes may be made at any time during the cut or at the end of the stroke if desired. It is possible



Spindle speeds on the improved No. 1 screw machine are all dial selected

to have four automatic spindle speed changes during one forward movement of the turret, or with every forward movement of the turret if desired.

The improved No. 1 motor-in-base screw machine provides eight spindle speeds ranging from 300 to 3600 r.p.m., which are all dial selected. Different spindle-speed ranges may be furnished if desired. The instantaneous spindle speed change from high to low, or from low to high, made through the transmission is a distinct advantage when changing from turning to threading or reaming speeds, and back to turning.

The automatic chuck and bar feed are cam operated, and after the cam clutch is engaged, it takes approximately one second for the bar to be automatically released, fed forward against the stop, and reclamped.

A combination screw and lever-type cross slide is regular equipment, which provides a slow screw feed for forming cuts and a quick-acting lever feed for regular work. The turret is lever-operated or a turnstile-operated turret can be furnished. The turret automatically is unclamped, indexed and reclamped, by movement of the turret slide.

Specifications: Swing over bed, 11½ in.; swing over cut-off slide, 5⅛ in.; swing over turret slide, 4 in.; chuck capacity for round bar stock, 1 3/16 in.; hole through spindle 1½ in.; cross travel of cut-off slide, 3½ in.; longitudinal travel of cut-off slide, 9 in.; diameter of turret, 6½ in.; maximum distance between end of spindle and face of turret, 14⅞ in.; effective turning movement of turret slide 5 in.; floor space required with bar feed, approximately 27x168 in.

The semi-horizontal brake drum Superfinisher incorporates a spindle which is run at approximately 150 r.p.m. and has a movement of approximately 450 oscillations per minute.

The drum to be superfinished is located on an adapter that is fitted to the hub of the drum. The drum is held on the adapter by an air-operated draw rod. During the first part of the cycle the roughing stones automatically are drawn into the surface under spring pressure which can be adjusted as required. As the cycle of the operation progresses, the finish stones automatically come in after the roughing stones are withdrawn from the surface, leaving the finishing stones to complete the remaining few seconds of the superfinishing operation. Total time required for the operation on an 11-in. drum is approximately 15 sec.

Brake drums are superfinished to a profilometer reading of approximately 10 micro-inches on this machine

Bryant Grinder Includes Hydraulic Wheel Traverse

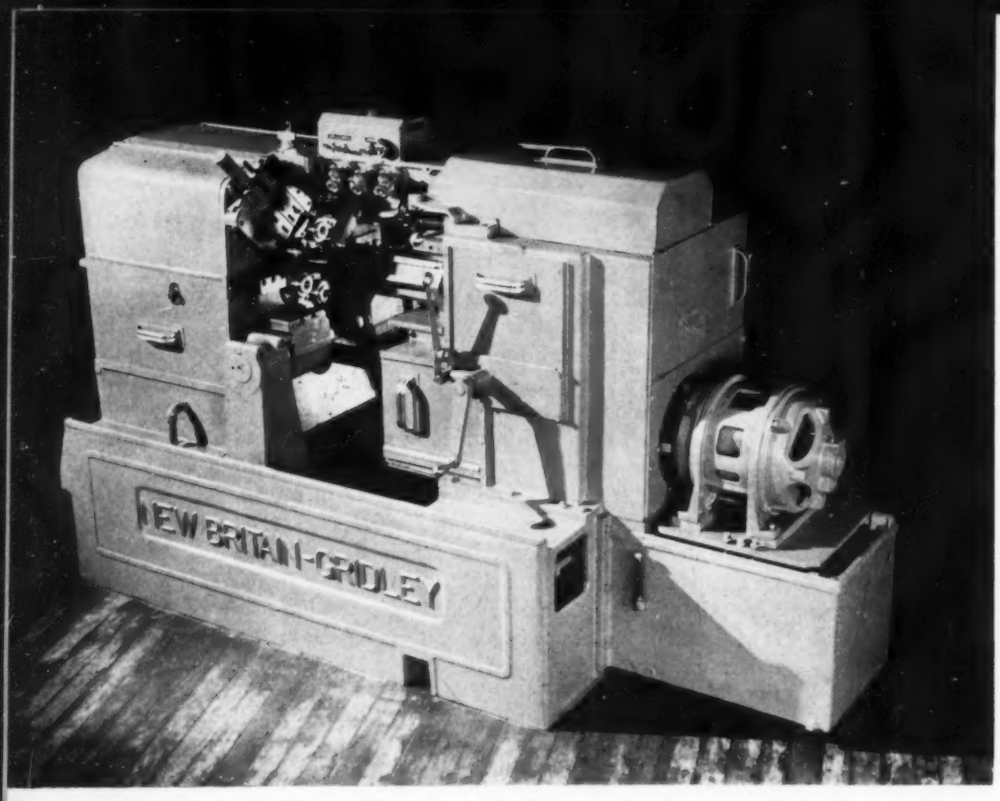
The No. 112 internal grinder, developed by Bryant Chucking Grinder Co., Springfield, Vt., incorporates fixtures which result in quick setups, convenient operations, high production and accurate finishes. The advantages of Bryant's slide control have been retained by mounting the wheel spindle above a cylindrical bar, carried by widely separated cylindrical bearings and supporting the rear of the slide on a hardened guide plate. This mounting provides a stable three-point support for the wheelslide which maintains alignment through long service. The three supported points are pressure lubricated.

The underslung slide bar also serves as a cylinder for the hydraulic longitudinal wheel traverse. In addition to the conventional control lever for the automatic operation of the slide, a valve and micrometer stop is provided to give the operator accurate control of the slide movement. This is said to be especially convenient in face grinding.

The wheelslide has a flat top surface, permitting location of the wheel spindles to suit conditions imposed by a variety of work. Provision is made for mounting an auxiliary facing spindle in addition to the standard hole grinding spindle.

The work is mounted on super-precision ball bearings and is driven by a variable speed reversible hydraulic motor which provides a wide range of work speeds in either direction. The spindle nose is of the flange type with taper pilot and cam lock for accurate mounting of chucking equipment.

The workhead is swiveled to permit grinding tapers up to 90 deg. included angle. It is mounted on a table supported by anti-friction ways for cross movement. The cross feed screw which controls the movement of this table is provided with means for rapid motion as well as micrometer feed.

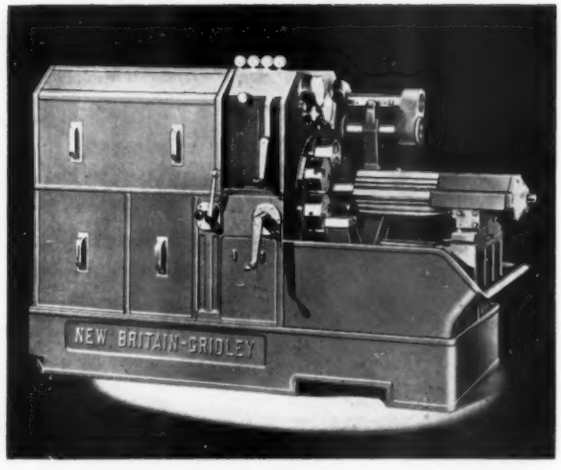


A circular forming slide which reciprocates on a hardened stud is incorporated in this Model 60 six-spindle automatic screw machine

New Britain-Gridley Screw Machines Have Circular-Section Forming Slides

A number of improvements and developments have been incorporated in the multiple-spindle automatic screw machines offered by New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn. The Model 60 six-spindle machine shown, as well as other models in this improved line, incorporate a circular-section forming slide construction wherein the circular slide reciprocates on a hardened steel stud, which, in turn, is supported at both ends to eliminate any tendency to vibrate and cause chatter. The circular slide is equipped with hardened steel bushings to reduce wear. The entire mechanism is entirely enclosed to prevent chips or dirt coming in contact with the bearing surfaces.

Another feature incorporated in these machines is an automatic spindle carrier lifting mechanism which raises the carrier off of its locating seat prior to indexing and holds it off this seat during the indexing movement. After indexing is completed, the carrier is properly located in position and securely clamped by a carrier clamping mechanism to prevent any possibility of weave during the cutting cycle. The automatic electric stop used on machines in this line is a mechanism which automatically stops the machine when the stock is exhausted in any spindle. The device is timed so that the empty spindle stops in the loading position with the collet open. The operator then simply removes the butt end and inserts a new bar, then gets the machine under way again. A signal lamp warns the operator when the machine is stopped by this device. Other features include hardened and ground cross-slide tool-holder baces, spherical roller collet closing devices, a circulating lubrication system, ample chip space and ready accessibility to all tools. The line is available in sizes from $\frac{5}{8}$ to $2\frac{5}{8}$ in. capacity.



Three open-end work-rotating chucking machines have been announced by New Britain-Gridley

Three work-rotating chucking machines of the open-end type are offered. These are a four-spindle Model 475 machine of 8 in. capacity, a six-spindle Model 665 machine of $6\frac{3}{4}$ in. capacity and an eight-spindle Model 86 machine with $6\frac{3}{4}$ in. capacity. The first two were developed to meet a demand for smaller capacity chuckers with open-end construction to afford maximum tooling accessibility. The eight-spindle model also is of the open-end type and will handle more complicated jobs, permitting operations formerly performed as subsequent operations.

The three models incorporate features used in other

SHOW IN PRINT

New Britain work-rotating chucking machines, including the automatic carrier lifting mechanism which lifts the carrier before index and automatically clamps it after indexing. Other features include swinging type forming arms which have no bearing surfaces or areas which can be affected by chips or dirt. These arms are constructed to permit heavy cuts. All models are equipped with a hydraulic chucking arrangement with means for automatically reducing chucking pressures in the loading position. Spindles are mounted in preloaded anti-friction bearings and the machine is equipped with automatic safety devices to prevent injury to the operator or damage to the machine should any jams occur.

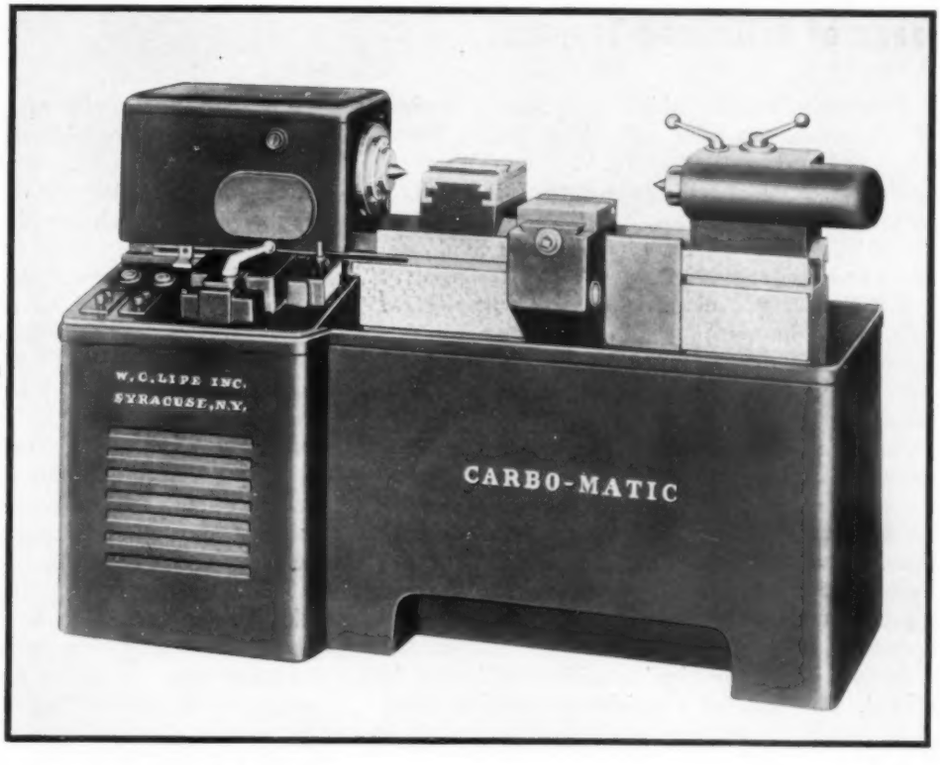
Lipe "Carbo-Matic" Lathe Hydraulically Controlled

A hydraulically controlled "Carbo-Matic production lathe introduced by W. C. Lipe, Inc., 208 S. Geddes St., Syracuse, N. Y., features automatic cycle control. By simply pushing a lever, the spindle starts and the tools advance to perform the operation. Tool relief follows; the carriage then returns to the loading position and the entire machine automatically stops, ready to be loaded for the next operation. Hydraulic operation applies to the spindle clutch, chuck and collet closers, longitudinal and cross-feeds and tailstock quill. No air is required either for operating or chucking.

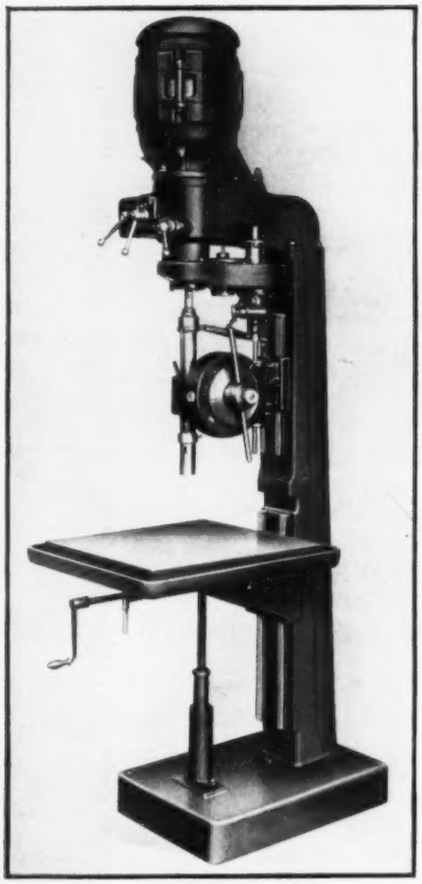
A tilted control panel with pressure gage, ammeter and pushbutton control is located in front of the headstock. Along the lower edge of the control panel is a drain trough which returns splashed coolant to the tank in the center of the base below. A time delay valve controls the front carriage, operated by rack and pinion, which in turn is impelled by an hydraulic cylinder. Maximum travel of the carriage is 15½ in. forward or reverse on either side of center. This carriage has an auxiliary slide micrometer adjustment for cut depth. A double cross-slide operated by a cam bar can be furnished, one for straight cuts, the other for taper or form cuts. The back carriage allows facing work up to 10-in. diameter.

The controls, which are separate, can be lifted off, exposing the manifold passages and permitting accessibility to piping without disturbing the panel. All controls are operated on 110-volt current through a self-contained transformer, and the electrically controlled switches are splash proof.

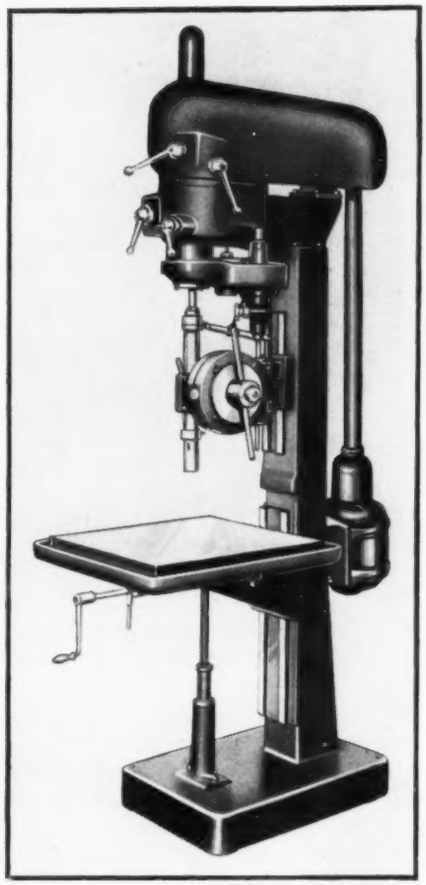
Features incorporated in the design of this machine are: (1) a high-tensile, nickel cast-iron base; (2) hour-glass worm drive eliminating backlash; (3) heavy spindle with minimum overhang, mounted on ball or roller bearings; and (4) a three-point suspension for headstock and bed, built in one large piece to prevent distortion. Spindle bearings are inclosed in cartridges. A built-in gear pump is used for lubricating all siding surfaces, bearings and worm gear unit uniformly.



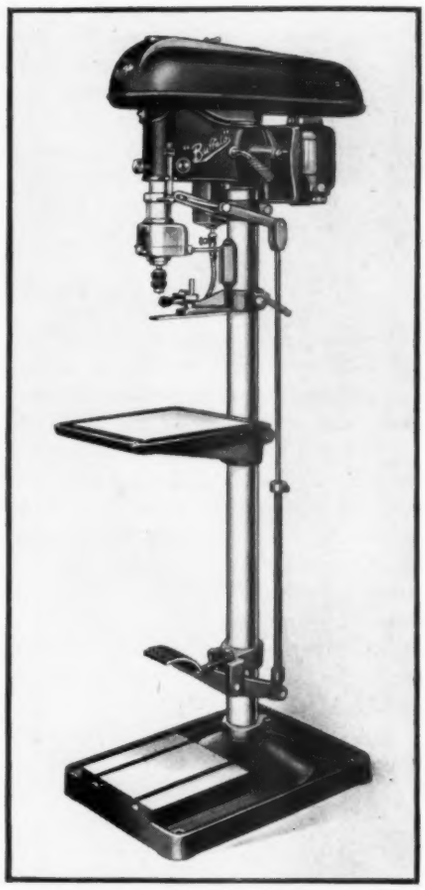
The Lipe "Carbo-Matic" lathe has an automatic operation cycle



Newcomers to the "Buffalo" line are the motor-spindle drills, which are available in two models



This sensitive drill has a variable-speed V-belt drive giving an infinite number of drilling speeds



The Type T-15 tapping machine has a full ball-bearing tapping attachment mounted rigidly on the end of a standard ball-bearing type drill spindle

Buffalo Forge Announces Wide Range of Drills and Tappers

Motor-spindle drills which incorporate a number of refinements are being offered by Buffalo Forge Co., 448 Broadway, Buffalo, N. Y. The motor used on the No. 2 unit is available in three different speed ranges and is of 2-hp. capacity. This No. 2 drill is available with 8, 12 and 15 in. overhang in both bench and pedestal models.

The No. 3 motor-spindle sensitive drill is available only with 12 in. overhang and is of the pedestal type. Either 2- or 3-hp. motors can be fitted to this No. 3 unit, and it is available with one medium-low speed range.

Both the No. 2 and No. 3 motor-spindle sensitive drills are available in multiple units of from one to six spindles. Both the table and the spindle of these units are adjustable vertically to suit working conditions. A power feed is standard equipment on both models. Speed control and starting switches are mounted on the head, within easy reach of the operator.

A No. 2 "Vari-Drive" sensitive drill also is offered. This unit has a variable-speed V-belt drive giving an infinite number of speeds within its range. It is available with or without back gears, and can be fitted with power feed. Reversing control can be connected for motor-reverse tapping. These drills are available in bench or pedestal models with 8, 12 or 15 in. overhang.

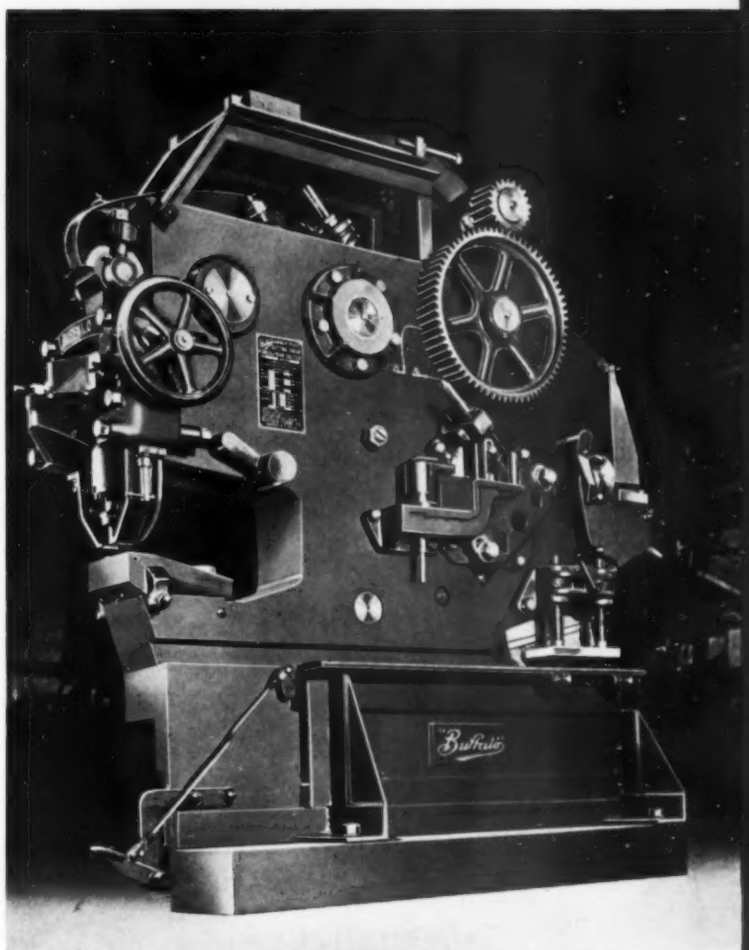
Built in two sizes, the Type T-15 tapping machine is claimed to assure high-speed production tapping at low cost. To meet requirements for automatic lubrication of the tap, a sight feed, automatic tap lubricating device is fitted to each model. Spindle feed is through a sensitive treadle, which is adjustable to give correct pedal pressure for the operator. A stripper or work hold-down device allows the operator free use of both hands for rapid shifting of the work. Table, stripper and lubricator are readily adjusted to meet varying requirements.

The No. 0 tapper has capacity for No. 2 tap to $\frac{1}{4}$ in. in brass, or 3/16 in. in steel and is driven by a $\frac{1}{3}$-hp., 1750-r.p.m. motor, preferably of the repulsion-induction type. The No. 1 tapper has a capacity ranging from 3/16 to $\frac{1}{2}$ in. in brass, or 5/16 in. in

steel and requires a ½-hp., 1140-r.p.m. motor. Both high-speed and low-speed attachments are available to suit special requirements. Both tappers have a 10 x 10 in. working surface on the base and a 10 x 11 in. table.

The No. 2½ Armour-Plate Universal Iron Worker is a combination punch and shear and bar cutter arranged for both notching and coping operations without changing tools. The punch head is of the full-floating type and may be brought down for centering punches and dies, or for locating center holes correctly, by means of a handwheel. The punch will stay down as long as desired, and may be lifted, but automatically will return to its highest position after the hole is punched by using the foot treadle. The punch stripper may be swung out of the way by releasing the handle at the right-hand side. Triple punching attachments can be mounted at any time.

A 90-deg. notcher can be built into the machine at either the punch or the shear end. For shops having considerable notching and coping work, the machine can be furnished with both tools built-in. The bar cutter section cuts angles, square and miter. Knives are made in five sections for easy replacement. Strippers for angles as well as round and square bars are always in place. This model is double backgeared. The machine has capacity for shearing ¾ in. thick plates.



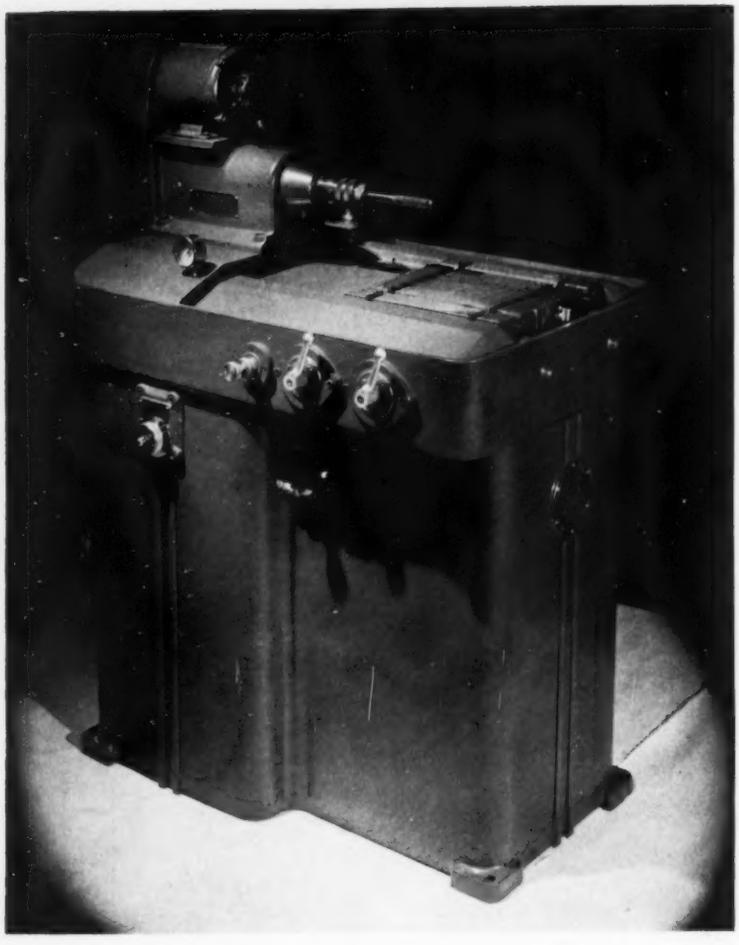
Five separate tools are arranged for quick operation in this No. 2½ Universal Iron Worker; the frame is of all-welded construction

Micromatic "Hydrohoner" Gives Small Bores High Surface Finish Rapidly and Accurately

Using new combinations of mechanical and hydraulic controls, the "Hydrohoner" developed by Micromatic Hone Corp., Dubois St. at Horton Ave., Detroit Mich., has a selective, wide range of speed combinations of rotating and reciprocating spindle travel. The relatively high-speed abrasive motion thus produced is combined with a low-speed reciprocating movement of the work, which is chucked or loaded in a fixture and mounted on the hydraulically actuated work table. In the operating cycle, the work is moved up automatically to the working position, and the table is slowly reciprocated through its predetermined working stroke. Range of stroke provided on standard machines is: spindle, 0–½ in.; table ½–8 in. Stroke is adjustable. Expansion of abrasive members is controlled hydraulically.

The "Hydrohoner" uses a form of swash-plate action to obtain a rapid odd-ratio reciprocating motion of the spindle as related to its rotation. This produces a multi-directional travel path of the abrasive, which assures continuous, uniform abrading effort throughout the entire operating cycle. The combination of spindle and work movements produce a uniform, free-cutting action which permits the removal of substantial amounts of stock rapidly.

The expansion limit of the tool is predetermined by setting the head adjustment on the nose of the machine spindle. In addition, microscopic increments of expansion or feed adjustment, ranging from 0.00005 to 0.000125 in. on, and according to, the diameter, may be made by manual control during the operating cycle if desired.



Uniform diameter size and low-tolerance accuracy are claimed for this "Hydrohoner" announced by Micromatic

A single movement of the operating hand lever starts a synchronized cyle of actuations, comprising: (1) the table automatically moves carrying the work from the loading into the honing, or working position, (2) the spindle motor starts the rotation and reciprocation of the spindle, (3) the hone automatically is expanded and the actual honing cycle started at the precise time when the work is in the predetermined honing position. Likewise, a single reverse movement of the operating hand lever causes the stones to contract and, simultaneously, stop spindle rotation and reciprocation, and automatically return the table to the loading position.

The "Hydrohoner" is equipped with a coolant tank, pump and filter for wet operation. Hone bodies are available for every 1/32 in. increase in diameter of bores. All hone bodies are interchangeable on the machine and are made with a ball retaining mechanism to facilitate quick interchange. Abrasive sticks are mounted in simplified stone holders which are easily replaced in the hone body. Spindles are V-belt driven, with various speed pulleys available for interchange to secure any desired speed range.

Haskins Tapper Air Controlled

Compressed air, controlled by an automatic air valve, furnishes the pressure required for both the tapping and reversing strokes of the tap head on the No. 2-C tapping machine announced by the R. G. Haskins Co., 2760 W. Flournoy St., Chicago, Ill. This machine has a capacity of from No. 8 to 5/16 in. in steel and $\frac{3}{8}$ in. in brass. In this type of tapper, the motor drives the tap through a V-belt and multi-speed pulleys.

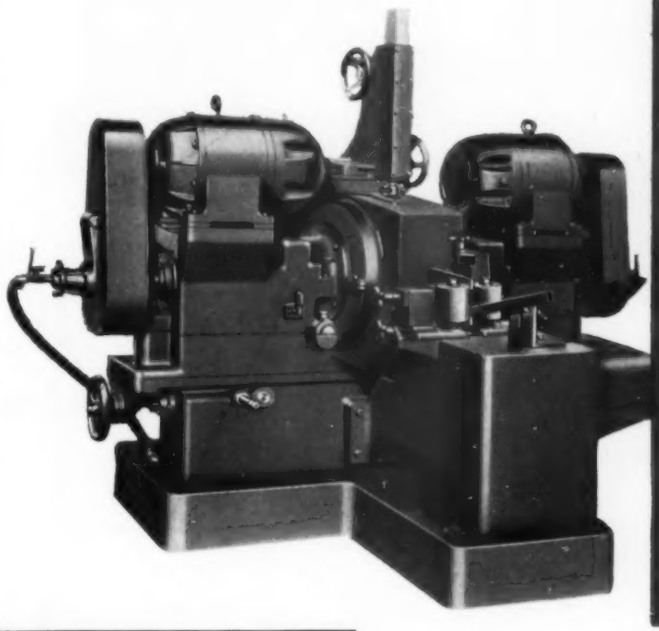
The automatic valve which supplies compressed air for moving the tapping head also controls the speed with which the tap is fed into and reversed out of the part. A pedal unit enables the operator to start or stop the tapping cycles, which are under control of the automatic valve. The machine will operate in continuous cycle as long as the air valve is held open. It also can be used intermittently by operating the pedal and then releasing it to produce one complete cycle. This machine is adapted to tapping parts held in simple holding fixtures or magazine fixtures; it also is adapted to hopper feed, dial feed or other specially designed fixtures.

An automatic valve controls the compressed air which moves the tap head on this Type C tapper

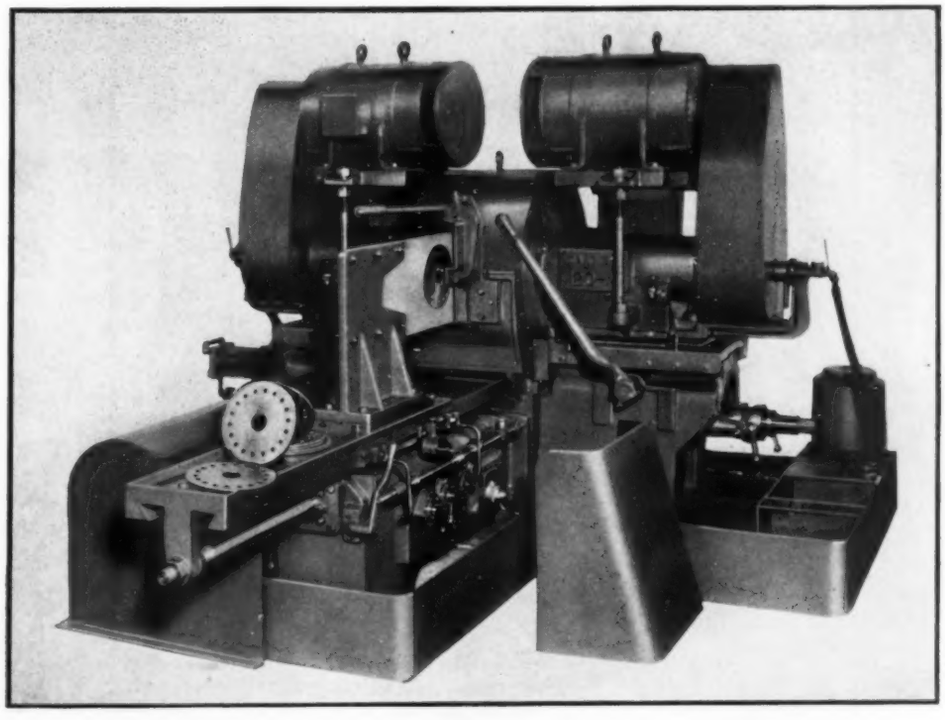
Precision Disk Grinding Performed On Gardner Double-Spindle Machines

Precision disk grinding is possible on the two double-spindle grinders manufactured by the Gardner Machine Co., Beloit, Wis. The No. 84-30 double-spindle grinder, carrying $5\frac{7}{8}$ in. diameter spindles and weighing approximately 15,000 lb., is equipped with a special rubber-roll feed fixture which sends roller bearing races through the two opposed grinding members at the rate of 60–75 per min. The parts are supported by two hardened steel guide bars which extend through the machine and the parts drop out at the rear by gravity. The bearing races are held within 0.003 to 0.005 in. for parallelism and 0.004 in. for uniformity.

A No. 120A-26 double-spindle grinder is set up to grind automobile clutch spring disks measuring $9\frac{3}{8}$ in. outside diameter and $\frac{1}{8}$ in. thick. These disks are made of high carbon spring steel and are ground on two parallel faces. Each disk is carried between the abrasive members in a blade-type fixture mounted on a hydraulically-operated knee. The knee oscillates automatically, thus permitting the taking of several passes or cuts while the grinding heads are hydraulically closed in upon the work. The piece is held loosely enough to permit spinning during the grinding operation. These thin clutch spring disks are ground at the rate of 70 to 80 per hour, and are held within 0.003 to 0.005 in. for parallelism and 0.003 in. for uniformity. These figures are based on an average stock removal of 0.006 to 0.008 in. over-all.

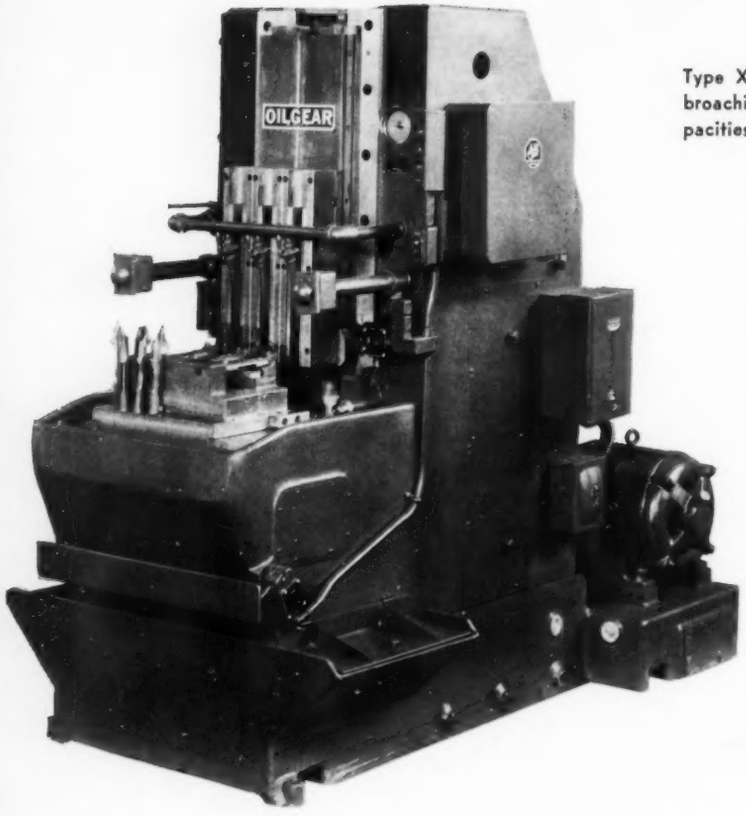


A special rubber-roll feed fixture is used on this double-spindle No. 84-30 grinder to feed roller bearing races between the opposed grinding members



The fixture on this No. 120-A-26 double-spindle disk grinder was designed especially for automobile clutch spring disks

The

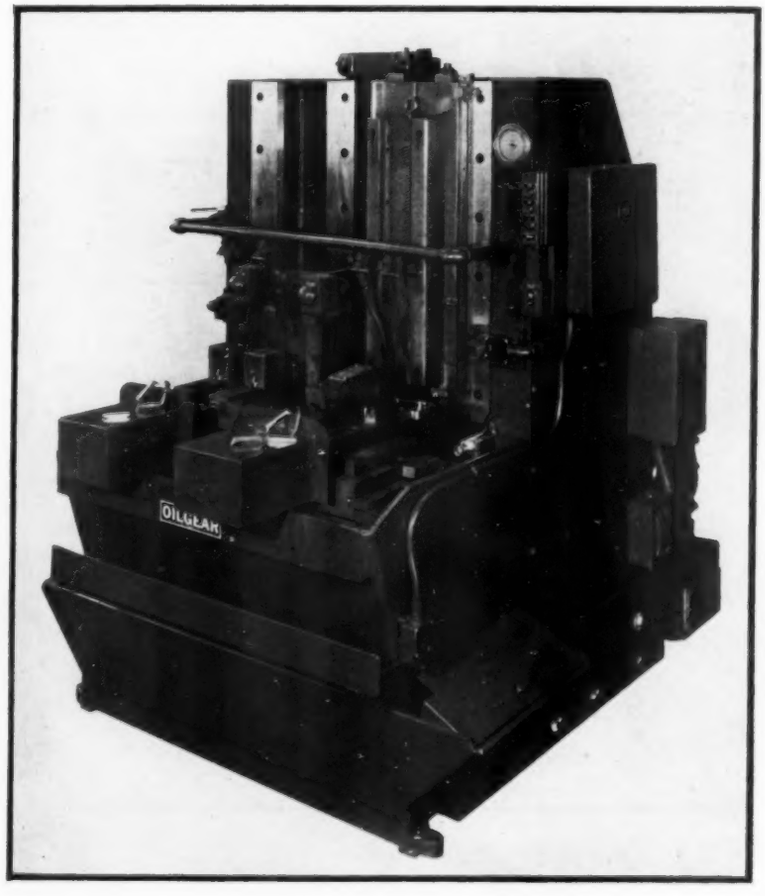


Type XS single-slide vertical surface broaching machines are made in capacities up to 25 tons

The Type XS single-slide vertical broachnig machines and the Type XD double-slide vertical surface broaching machines developed by The Oilgear Co., 1302A W. Bruce St., Milwaukee, Wis., each are available in five sizes, varying in normal capacity from 3 to 25 tons and broaching strokes from 30 to 66 in. Outstanding features claimed for these machines are: dual safety pushbutton control with selector switch for manual semi-automatic or full-automatic operation; convenient knee bar for emergency stop; ample surfaces on shovel tables and tool slides for mounting a multiple of fixtures and tools; rectangular hardened and ground ways for shuttle tables and tool slides with gib type adjustment for working clearances; automatic pressure lubrication of shuttle ways, tool ways and shuttle operating mechanism; hydraulically and mechanically operated shuttle tables with positive interlock operation of shuttle tables and tool slides; micrometer type positive stops for precise positioning of shuttle tables in broaching position; tool slide rams in tension when broaching; and vertical motor-driven

Oilgear Surface and Internal Broaching Machines Employ Welded Steel Construction

Full safety pushbutton control is featured on the Type XD double slide vertical surface broaching machines



coolant pump and controlled fluid power operation. Each size of machine is equipped with a Type DX two-way variable displacement heavy duty radial piston fluid power pump arranged for direct drive. This pump is of sufficient capacity to provide variable broaching speeds up to 37 ft. per min. and independently variable return speeds up to 100 ft. per min.

Two pushbuttons above the selector switch provide for manual operation of tool slides and shuttle tables for set-up and test purposes. Setting the selector switch for semi-automatic operation and depressing the dual safety pushbutton control initiates a complete broaching cycle. Setting the selector switch for full-automatic control provides continuous operation without further attention.

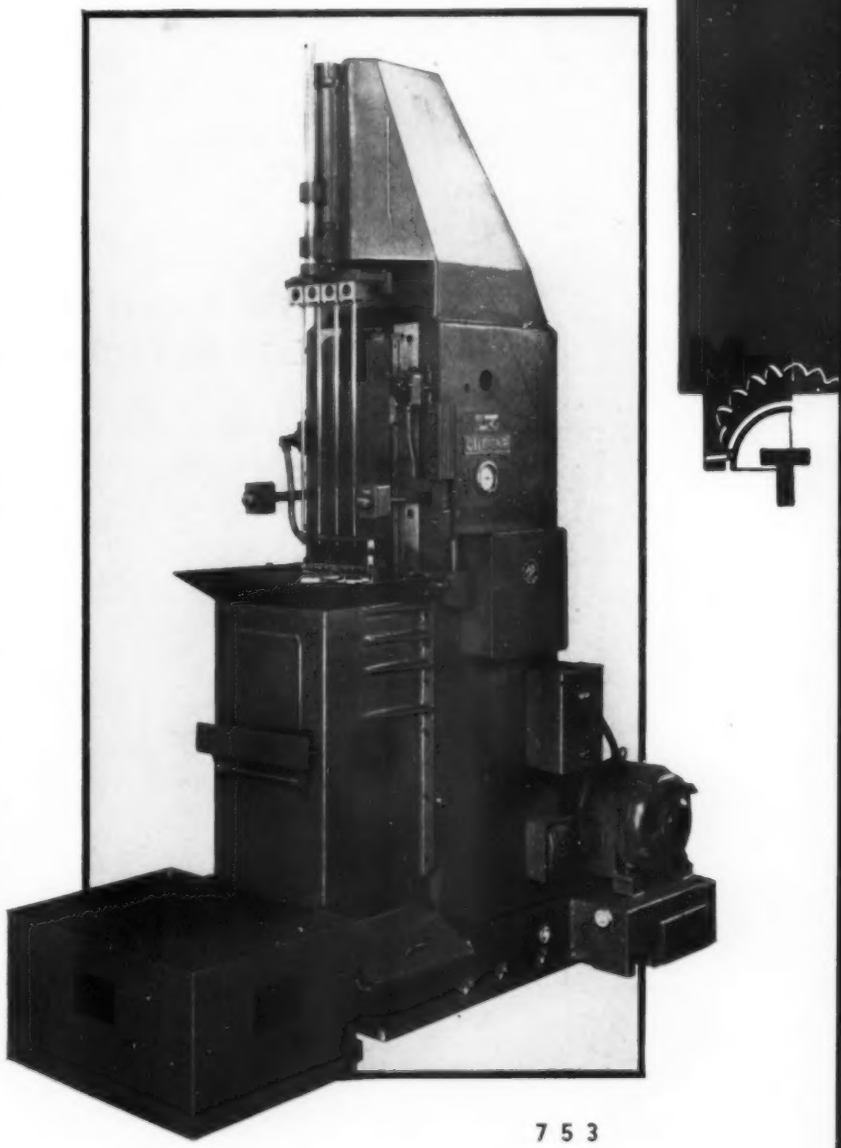
There is ample finished area on the shuttle tables and tool slides to accommodate tools and fixtures for a multiple of operations. The single-slide machine shown is equipped with fixtures and tools for broaching six side surfaces on three rifle receivers per stroke at the rate of 600 finished pieces per hour. The double-slide machine also is set up for operations on rifle parts. Clamping and unclamping of parts is fully automatic.

All-steel welded construction is used in the base, frame and table of these broaching machines. Adjustable cams limit the movement of the main tool slides to a preset stroke and position. A vertical motor-driven lubricant pump is mounted inside the base. Reservoirs for both cutting lubricant and fluid power oil are built in the machine base and there are chip troughs on each side of the machine. Preset relief valves built in the pump protect work, tools, pump and machine against overloads.

Five sizes of the type XP vertical pull-down broaching machines now available vary in normal capacity from 5 to 37½ tons and broaching strokes from 30 to 66 in. Features claimed for these units include automatic tool handling, automatic puller operation, dual safety pushbutton control with selector switch for manual or semi-cycle operation, automatic pressure lubrication of tool slide and ways, positive pressure lubrication of work and tools, knee bar emergency stop and fluid power operation. Each size is equipped with a Type DX two-way variable displacement heavy-duty radial-piston fluid power pump arranged for direct drive. This pump is of sufficient capacity to provide variable broaching speeds up to 37 ft. per min. and independently variable return speeds up to 100 ft. per min.

When broaching, the operator merely loads and unloads the work and depresses the simple pushbutton control. In operation, the upper ram and tools move down to thread tool shanks through the work into the pullers, the main slide automatically pulls the tools downward through the work, the work is unloaded and the main slide returns upward, then the upper ram receives the tools and lifts them upward to the loading or starting position. There are no tools to handle or control and clamp levers are not necessary. Semi-automatic or full-automatic control also is available. In addition, special machines of a similar design except arranged for three-purpose pull, push and surface broaching are available. Pull broaching is performed as in the above machine, push broaching is effected by mounting a head on the top of the tool slides, and surface broaching is performed by fixing the tools to the vertical tool slides.

Type XM vertical Cyclematic broaching machines now are available in three sizes with normal capacities varying from 15 to 37½ tons and with broaching strokes of 54 and 66 in. The Type DX fluid power pumps used in these machines have sufficient capacity to provide variable broaching speeds up to 30 ft. per min. and independently variable return speeds up to 80 ft. per min. Dual safety pushbutton control with selector switch for manual, semi-automatic and full-

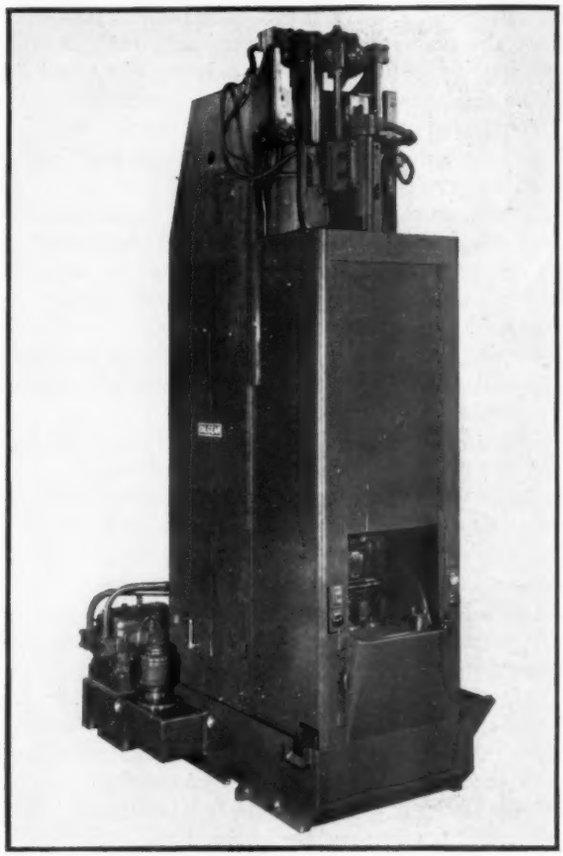


Five sizes of the Type XP vertical pull-down broaching machines are available

automatic operation is provided. A key type push-button control positions the tool-handling carriage. Among the important features of this machine is an automatic tool-handling mechanism, key-inserting mechanism and work-ejecting mechanism. During normal operation, the operator merely loads the work on the table and depresses the pushbutton control.

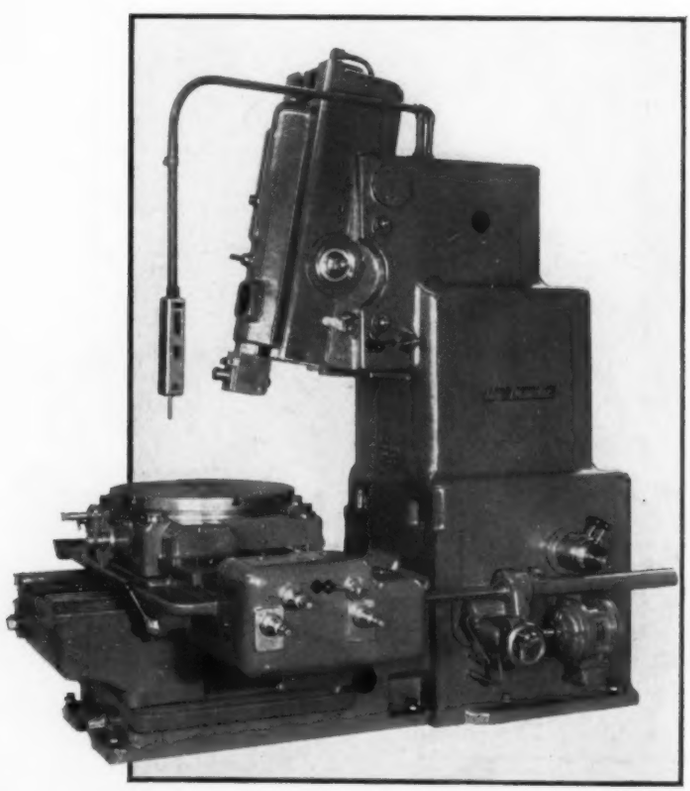
The "Cyclematic" principle of broaching causes the chips to fall away from the tool quickly and assures positive and continuous lubrication of the work and tools. As the work passes upward, the void between each two broach teeth fills with cutting lubricant, flooding the upper surface of the work. Ample area on the worktable accommodates large fixtures for a multiple of operations.

Electric pilot motor operation of the vertical screw for raising and lowering the position of the tool-handling cylinder to suit various lengths of tools used permits the operator to make changes without leaving the front of the machine. Two pushbuttons on the left-hand side control the operation of the pilot motor and these are equipped with locks so as to prevent maladjustment once the machine is set for a specific operation. A detent device prevents damage to the upper carriage or work screw when improperly adjusted.



"Cyclematic" broaching is possible with the Type XM vertical broaching machine which is available in three sizes

High Cutting Speeds Obtainable in Rockford 12-in. Vertical "Hy-Draulic" Shaper



The hydraulic drive to the ram of the 12-in. "Hy-Draulic" vertical shaper developed by Rockford Machine Tool Co., Rockford, Ill., is so designed as to give a total of 150 strokes per minute on the minimum stroke of 1 in. The table is provided with micrometer adjustment for setting in longitudinal and lateral travel. Provision also is made for the use of dial indicators and precision measuring bars for accurate setting, following the same method as is used in precision table setting for jig boring. It was developed to perform work in the field of vertical shaping rather than slotting.

The column is of box section and is designed primarily to give rigidity to the support of the combined ram bracket and ram guide. Hydraulic pump, piping and controls as well as the hydraulic oil reservoir are located in the base of the column. Electric controls are housed in a compartment at the rear of the column.

Dial indicators and measuring bars are used for accurately setting the table of this 12-in. vertical shaper. The head can be tilted ten degrees

The ram bracket forms both bracket and ram guides. This is mounted in the column on suitable trunions which permit the ram to be tilted 10 deg. from the vertical. Tilting is done by a ratchet lever operating on a right-hand and left-hand screw. Two positive lock bolts on either side secure the ram bracket in the desired operating position.

The hydraulically operated ram is mounted in heavy duty shaper type ways with an adjustable gib in one side, the bearing clamp being locked after adjustment by eight screws. The ram has a cross-head, adjustably mounted on a screw, to which the actuated piston is attached. The adjustment of the cross-head positions the ram relative to the work. Stroke adjustment is made by graduated dial settings on the side of the ram bracket.

The ram has a 360-deg. swiveling tool head. Dual stud and stop levers, one on each side of the column, control the ram from either side of the machine. Pump controls for setting the speed of the ram travel in both cutting and reverse rate are mounted in the right side of the column. The hydraulic table-feed cylinder with its adjusting screw and feed shaft brackets also are mounted on the right side of the column as is the table rapid traverse motor. The feed screw for the longitudinal traverse of the saddle is mounted in the bed in a fixed position, a revolving nut carried in the saddle providing the required movement for either slow feed or rapid traverse. Both table cross-feed and saddle longitudinal feed can be furnished with micrometer adjustment for precision table setting.

A traverse selector lever selects the desired saddle or table movement. Acting with the selector lever is the directional-traverse and feed-engaging lever mounted at the front of the saddle. Rapid traverse of the table is obtained by setting the control levers in proper position and then using pushbutton stations on a pendant switch for motor control. This pendant is equipped with both "jog" and "run" pushbuttons. The jog button also is used for stop. The combination of slow feed or power rapid traverse through a single drive shaft is accomplished by using an overrunning clutch.

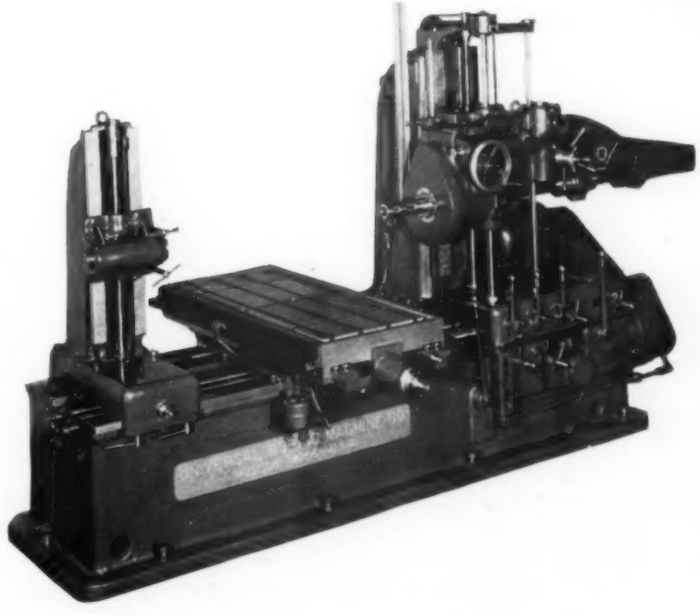
The rotary table of this machine is 28 in. in diameter. Drive is through suitable reduction gearing by an hour-glass type worm in constant engagement with the worm gear. To permit positive locking, the rotary table is equipped with a manually controlled indexing or locking device actuated by a knurled knob at the front of the table. The indexing stations are 90 deg. apart. A dividing head for accurate indexing of the rotary table can be furnished as a built-in part of the machine. This head can be disengaged when not in use.

Specifications: Maximum working stroke, 13 in.; minimum working stroke, 1 in.; vertical adjustment of ram, 15 in.; distance from table top to end of ram, $\frac{1}{4}$–30$\frac{1}{4}$ in.; distance from face of tool head to face of column, 22 in.; ram cutting and return speeds, 10–150 ft. per min.; table travel, both longitudinal and transverse, 26 in.; height of rotary table from floor line, 36 in.; height over-all with ram up, 113 in.; width, 86 in.; length, 105 in.; net weight less electrical equipment, 10,000 lb. A 7$\frac{1}{2}$-hp. motor is required for the main drive, while a 1$\frac{1}{2}$-hp. hoist-type motor is used for rapid traverse.

Universal "Triway" Boring Machine Comes in Two Speed Ranges

The improved 3-in. spindle horizontal boring machine with "Triway" bed offered by Universal Boring Machine Co., 312 Main St., Hudson, Mass., is offered in a standard speed range of 16 to 650 r.p.m. and a special high-speed range of 15 to 1200 r.p.m. The entire range of speed is available over the 24-in. traverse of the spindle at the same head setting. Design of this machine is such that there are no overhanging parts, all units being so mounted that they are directly on the base. The entire machine, including head counterweight is above the floor line.

The head assembly is of unit design with the spindle carrier cast integral with the main body of the head. Correct spindle elevation is maintained by one long adjustable tapered gib. Back gears and



A precision dial and rod measuring system can be fitted to the table and head of this "Triway" horizontal boring machine for precision settings

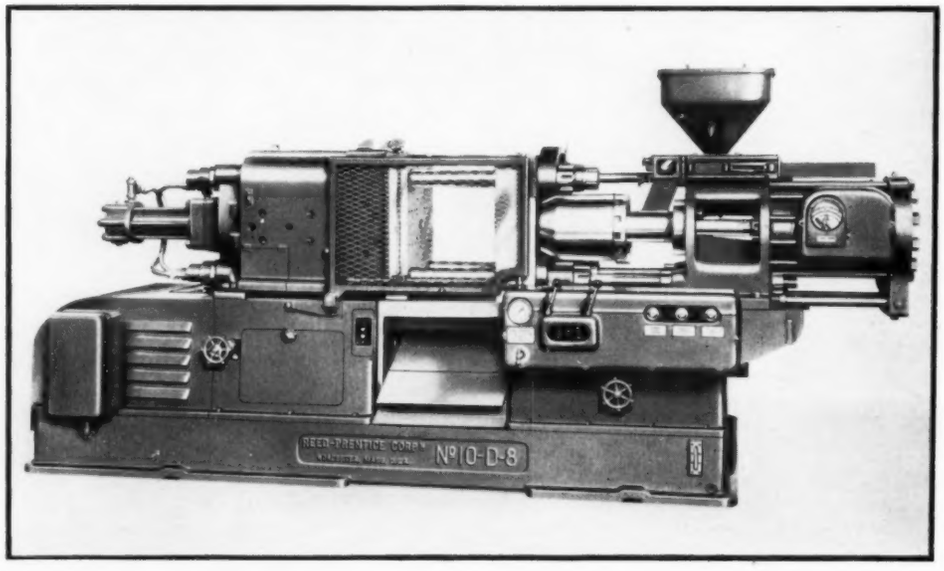
the 4-to-1 spindle feed reducing gears are located in the head.

Hand cross-feed with micrometer dial graduated in thousandths is provided at the front of the table. Limit trips operating the table-feed clutch prevent over-travel of the table in either direction. An improved method of saddle clamping operates from the front of the saddle locks both front and rear, both in a downward direction and automatically equalized. Table clamping is from the front.

Feed and speed units are mounted in the bed eliminating overhang and vibration. The speed box is driven from the motor through a silent chain or V-belt. Rapid traverse in both directions to all units is obtained through a multiple-disk rapid-traverse clutch, so designed as to disengage automatically when the operator removes his hand from the control lever. Feed and rapid traverse cannot be engaged at the same time. Rapid traverse is always in the opposite direction to the feed setting.

Specifications: Spindle diameter, 3 in.; continuous spindle traverse, 24 in.; spindle traverse with one resetting, 48 in.; number of spindle speeds, 12; number of feeds for all motions, 18; rapid traverse, approximately 100 in. per min. Two standard sizes of these machines are offered, in the smaller units, the maximum distance from the face plate to the outer support is 60 in. In the larger unit this distance is 72 in. In the first machine there is a maximum distance of 27 in. from the top of the table to the centerline of the spindle, while in the larger machine this distance is to 33 in. Working surface of the standard table is 26 x 58 in. for the smaller machine and 32 x 58 in. for the larger.

Reed-Prentice Plastic Injection Molders Now Made in Four Standard Sizes



A recently developed magnetic heating cylinder is one of the principal features of this No. 10D-8 plastic injection molder

Four improved plastic injection molders, listed as the No. 10A-2, 10A-4, 10D-6 and 10D-8 machines, have been made available by Reed-Prentice Corp., Worcester, Mass. They have a molding capacity of 2, 4, 6, and 8 oz. per shot. Standard machines in all four sizes are arranged to develop 16,000 or 20,000 lb. per sq. in. pressure on the material, depending on the total pressure developed in the injection cylinder. Where materials require higher pressures, equipment can be furnished to give up to 40,000 lb. per sq. in. pressure on the material. When manually operated, each of these machines is controlled by two levers, one for closing the mold and the other for injecting the material. Reversing the direction of the levers opens the bolt and brings the plunger back ready for the next injection.

For semi-automatic or full-automatic operation, the cycle required is selected by means of a selector switch on the electric control panel. When automatically operated, the machine is electrically controlled through three time clocks adjustable from 0.2 to 120 sec. One time clock determines the time the pressure stays on the plunger, one determines the period for solidification of the material, and one determines the time the mold is open for injection of the product.

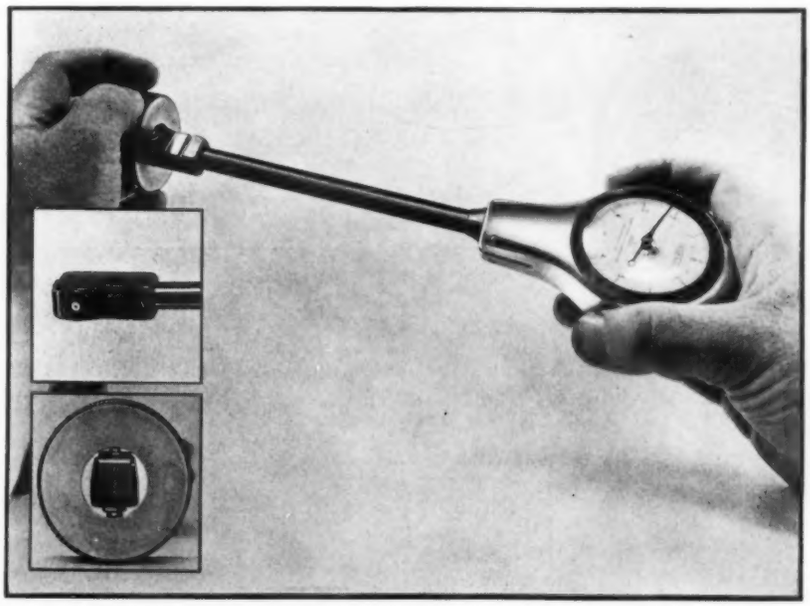
To provide for high-speed injection of the material

into the mold, the hydraulic circuit is designed to utilize the volume of both the high- and low-pressure sections of the Vickers hydraulic combination pump at full pressure during the injection stroke. This action is controlled through a solenoid operated valve and a timing device mounted on the injection cylinder.

An improved magnetic heating cylinder has been developed for these machines. The body of the heating cylinder is subjected to an alternating magnetic flux which produces even heating throughout the heater. The temperature is said to be practically uniform throughout the body of the heater and this, in combination with the annular injection plunger, streamlining of the passages and other features has practically eliminated discoloration from overheated material.

All machines in this line have increased locking pressures and casting areas. Die space in each of these four machines is 7 in. minimum and 18 in. maximum. Maximum casting area in the mold at 20,000 lb. per sq. in. pressure is 36 sq. in. for the two No. 10A machines and 66 sq. in. for the two No. 10D machines. The No. 10D-8 machine shown will plasticize approximately 55 lb. of material per hour, depending on product and mold construction. Total pressure on the injection plunger of this machine when operating at 20,000 lb. per sq. in. pressure on the material is 113,000 lb. Die plates measure 21 x 25 in. and the stationary die plate is 7 in. thick. Space between bars measures $11\frac{1}{4}$ x $14\frac{1}{4}$ in. and the bars are $3\frac{1}{4}$ in. in diameter. The mold opens 8 in. in all four machines.

Bore Gage and Super-Sensitive Indicator Announced by Federal Products



The entire movement of the Model 1201 bore gage is suspended on springs and incorporates a metallic bellows to eliminate friction

Inertia and friction are reduced to a minimum in this super-sensitive dial indicator

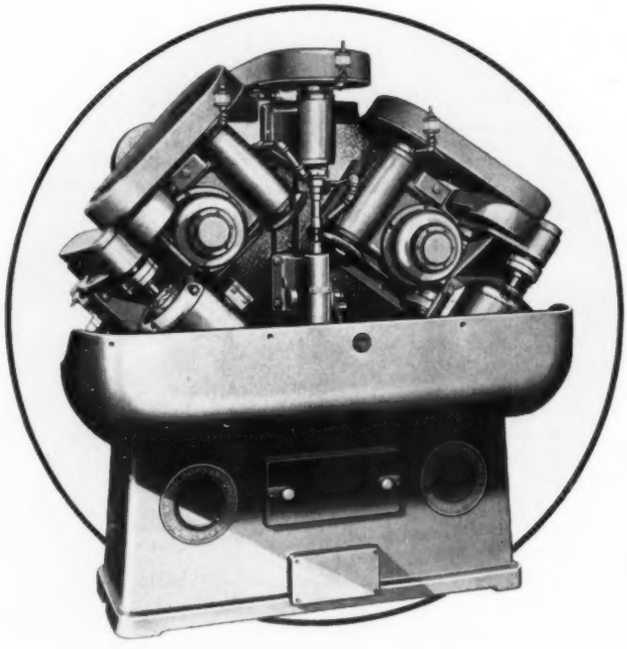
Made in five sizes capable of measuring holes from $\frac{3}{4}$ to 14 in. diameter, the Model 1201 cylindrical bore gage offered by Federal Products Corp., 1144 Eddy St., Providence, R. I., is of the two-point contact type and measures directly across the diameter of the hole. It has two auxiliary locating points which operate simultaneously to locate the sensitive contact diametrically across the hole. There is no bell crank bearing, or other mechanism which can wear or cause error. The contact points are connected through a continuous unit with the indicator.

The super-sensitive Type C2IB indicator uses a metal bellows and a leaf spring. This does away with all joints and levers and, as a result, is claimed to reduce inertia and friction to a minimum. It can be furnished with regular jewelled bearing movements and can be applied to all circular types of indicators. For the time being, this design is limited to four sizes and values of graduation, the C2IB having a dial diameter of $2\frac{7}{32}$ in. with 0.0001 in. graduation. The E2BB indicator has a $3\frac{5}{8}$-in. diameter dial and reads to 0.00005 in.

The

"Roto Shaver" and Gear Finishers Offered By National Broach and Machine Company

A two-spindle "RotoShaving" machine has been developed by the National Broach & Machine Co., 11457 Shoemaker St., Detroit, Mich., for machining cylindrical metal surfaces with special circular shaving cutters. In precision this operation is equivalent to production grinding. It is claimed that this operation can be used in the place of green grinding where the hardness of the work piece does not exceed 30 Rockwell. This machine is being used in sizing and truing blanks prior to gear cutting and other operations where the amount of stock removed ranges from 0.010 to 0.015 in. on flat flanged surfaces, or approximately 0.020 on the diameter of cylindrical or circular pieces. Stock is removed from either circular flanges or cylindrical surfaces and as many as four or five surfaces may be machined simultaneously. Tolerances on diameters are held to about 0.001 in. Cutter life is usually about 4,000 pieces per grind, and the reconditioning of the cutter requires only conventional grinding equipment.



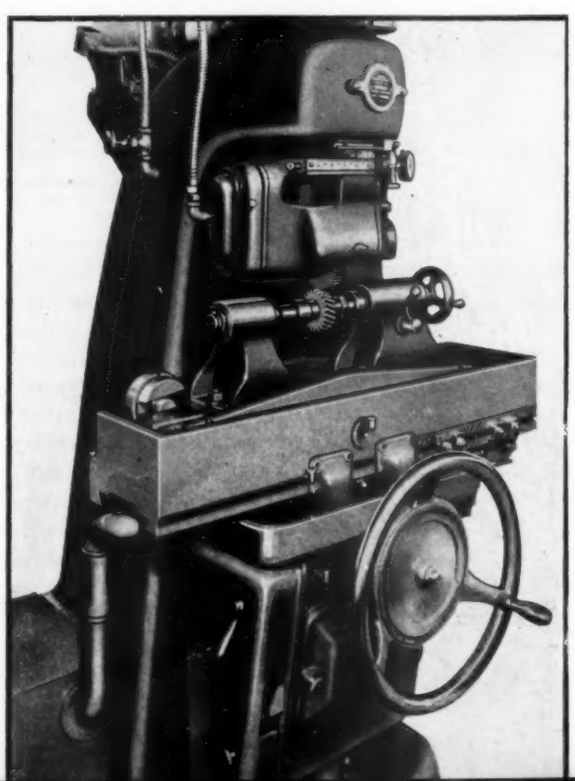
The "RotoShaving" machine can be used for sizing and truing operations on cylindrical blanks. Both cylindrical and flat flanged surfaces can be shaved to close limits

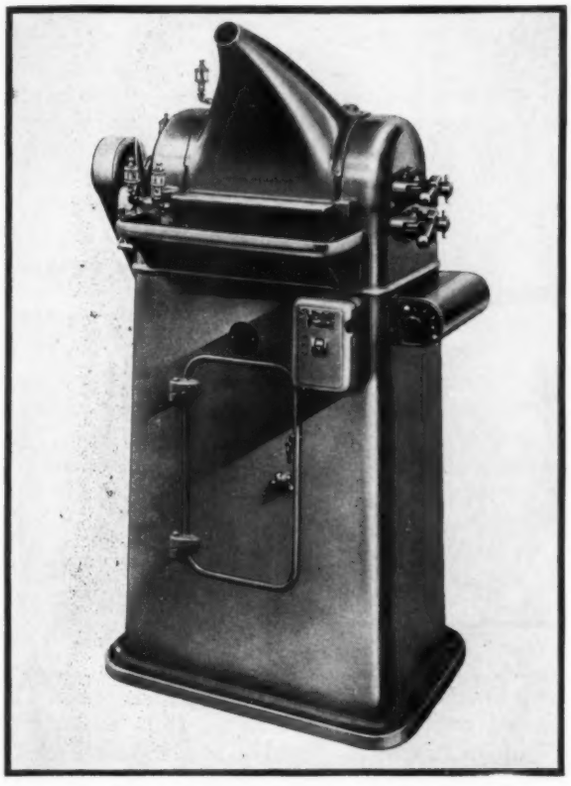
A "Red Ring" lead comparator which operates on the principle of comparing the lead of a helical work gear with that of a precision master lead also has been announced. A guiding or fixed ball pointer contacts the teeth of the master gear or disk and a similar pointer for recording contacts the teeth of the work gear. Sliding the comparator head by means of its hand wheel causes the guiding point to rotate both gears as it is traversed across the face of the master. The recording pointer, operating through a bell-crank mounting, shows the amount of lead error on a dial indicator mounted above the point on the spindle. Dual indicators allow for checking both sides of a gear tooth simultaneously. The machine can be used for checking gears integral with the shaft, as well as those mounted on an arbor.

The "Red Ring" gear shaver corrects tooth profile by shaving to within 0.001 in. It eliminates horizontal serrations and, at the same time, corrects index, eccentricity and helical angle. The cutter, which is an involute gear gashed or slotted along the faces of the teeth, meshes with the work gear, the axes of the two being crossed at an angle of about 10–15 deg. The cutter gear drives the work gear as the latter is traversed back and forth across the cutter. Stock is removed in fine, hair-like shavings, and any amount may be removed, depending on the depth of cut, and the number of operating cycles. Cutting tools may be reground five times, and each regrind is said to process from 5,000 to 15,000 work units.

A principal feature of this machine is its attachment for crowning gear teeth. Crowning is one of the effec-

Gear tooth profiles can be corrected to within 0.0001 in. rapidly and economically in the "Red Ring" gear shaver

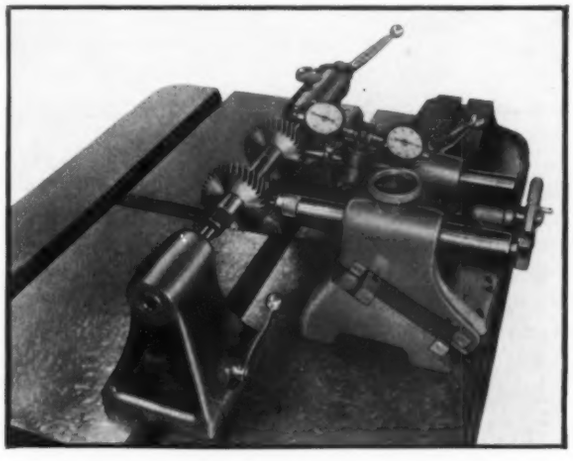




Gear sets can be checked for noise prior to assembly in the "Red Ring" gear speeder

tive procedures recently developed for silencing gears. Each gear tooth, either spur or helical, is given a slight barrel shape with greater thickness in the middle than at the ends. It has been found particularly effective on timing, transmission and certain types of reduction gearing. As crowning requires no more machine time than conventional gear shaving, no extra cost is involved.

Essentially a sound amplifier for determining before assembly whether or not a set of gears is going to be noisy, the "Red Ring" gear speeder can be used anywhere in the shop without the necessity for constructing a special sound-proof room. Use of such a unit avoids the cost of tearing down an assembly when it is found that the gears are too noisy.



Lead of the helical work gear is compared with a master lead in the "Red Ring" lead comparator

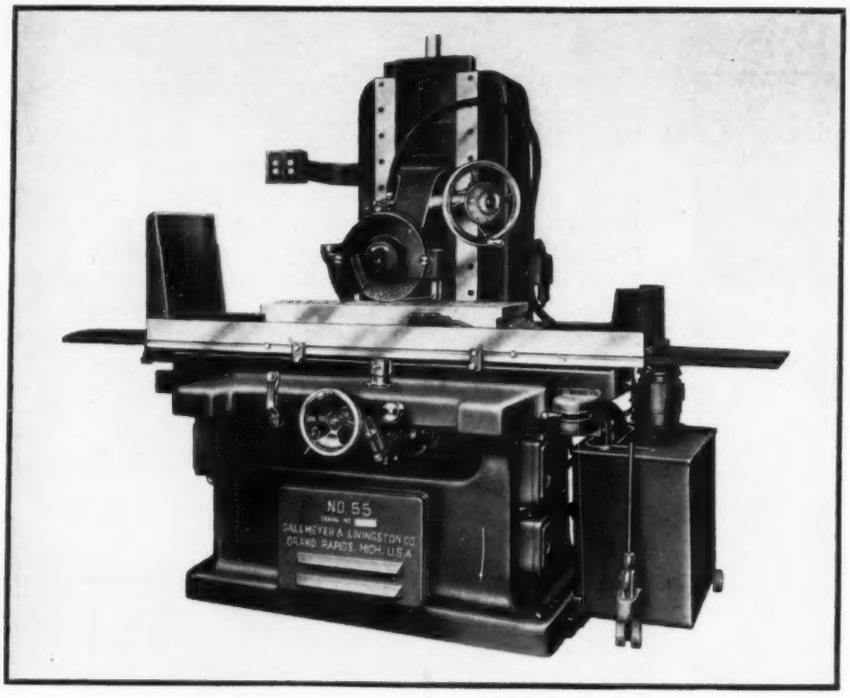
Gallmeyer & Livingston Surface Grinders Available for Toolroom Use

The method of raising and lowering the wheel head is a principal feature in the No. 55 precision toolroom surface grinder which has been redesigned by Gallmeyer & Livingston Co., Grand Rapids, Mich. A large handwheel providing for rapid movement of the wheelhead is conveniently located on the head and provides direct action through back gears to a worm and worm gear connected to the elevating screw. This handwheel is graduated in thousandths of an inch and is provided with a pointer which can be set for convenient reading. A knurled knob in the center of the handwheel carries a graduated dial reading in thousandths which can be set at zero in relation to the pointer on the larger handwheel traveling in the same direction but at a slower speed. This makes it easy to secure readings of adjustments in 0.0001 in.

These grinders are available in sizes ranging from 6 x 18 in. to 14 x 48 in. working surface of the table. The larger machines ordinarily are furnished with power rapid vertical travel of the wheelhead and with a portable motor-driven self-contained coolant system. The machine shown has a 12 x 36 in. working surface of the table and sufficient longitudinal and transverse table movement to enable the operator to clear the entire working surface of the table with the standard wheel. The maximum longitudinal table speed of 125 ft. per min. is provided, but the machine may be operated at almost any desired speed up to the maximum.

The grinders are built around a heavy one-piece column and base casting to insure permanent alignment between the vertical head ways and the cross travel ways. Weight of this casting in the No. 55 machine is more than 4,000 lb.

These units have hydraulically actuated cross-feed



A large handwheel provides for rapid vertical movement of the wheelhead on this No. 55 precision surface grinder

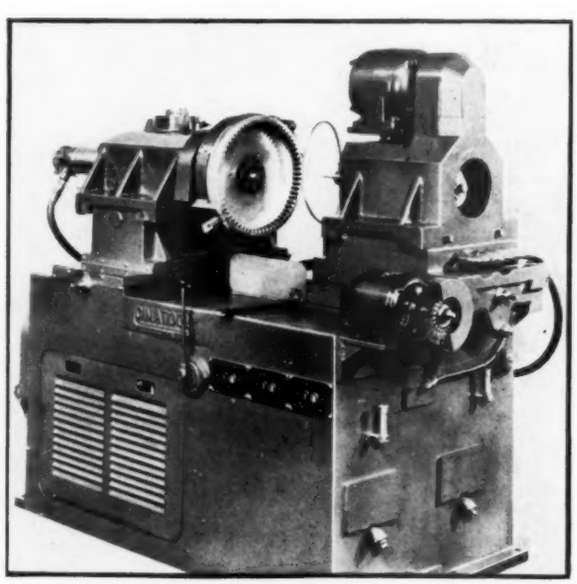
which may be set to operate at each reversal of the reciprocating table or at the end of the stroke only. The amount of cross-feed is adjustable, and can be set to feed either in or out as desired. The spindle head, fitted into the vertical ways with extreme care, carries an extra-heavy spindle with a minimum of overhang for the grinding wheel. The spindle runs in selected preloaded ball bearings. It is driven by V-belt from a motor mounted on an adjustable bracket attached to the head of the machine. This construction eliminates the idler jack arrangement and provides two spindle speeds.

Fly Cutters Used in Cimatool Gear Tooth Burring and Chamfering Machines

A complete line of automatic machines for chamfering and burring gear teeth has been developed by the Cimatool Co., 1517–1531 E. Third St., Dayton, Ohio. All of these machines are motor-driven. The No. 200-B gear burring machine can burr teeth at the rate of 1,250 per min. when using a fly cutter in each of two spindles. Action of the machine in general is similar to that of a hobbing machine. One of the fly cutters machines the front end of the tooth, while the other simultaneously machines the rear end. While the standard machine will handle gear sizes up to 8 in. diameter, provision can be made for larger gears.

The horizontal cutting spindles are mounted in a vertical column. They are adjustable vertically for a distance of $3\frac{3}{4}$ in., and laterally (to or from one another), for a distance of $1\frac{1}{2}$ in. They also are adjustable from front to rear through a 60-deg. arc; thus, any type of tooth may be accommodated. A quick-change timing adjustment provides for setting as close as 1/600 of a turn.

Machine operation is entirely automatic and includes hydraulic clamping. A solenoid-operated in-



Gear teeth can be burred over their entire profile with the No. 201-A contour burring machine

stantaneous friction brake stops the machine after a complete cycle, leaving the cutting tools in a position for unobstructed unloading of the work. Change-over from one job to another is accomplished readily. If the new job has the same pitch as the old one, even though the number of teeth are not the same, new adaptors and a few simple adjustments are all that is required. A new drive gear is required only when there is a change of pitch.

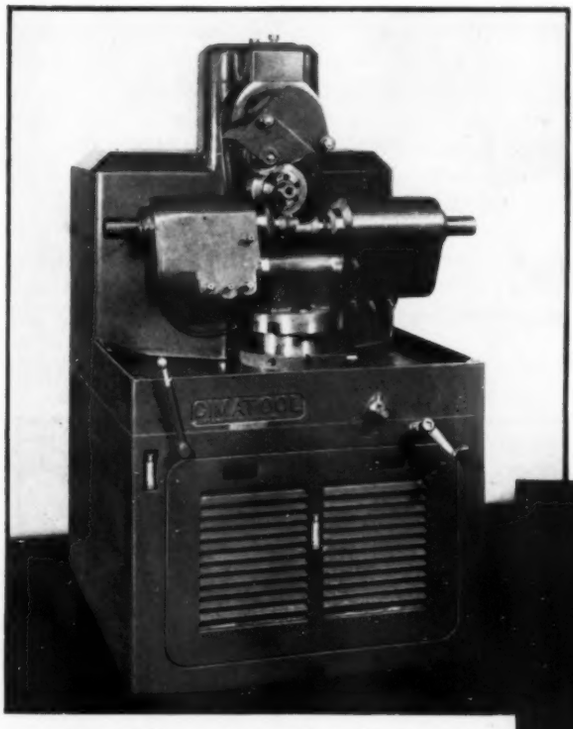
The No. 201-A contour burring machine is designed to burr automatically the ends of either internal or external gear teeth over their entire profile, top, sides and root, and is claimed to be especially valuable for large ring gears and all types of aircraft gears. It has one cutter spindle which carries a pencil cutter formed according to the type of tooth being burred and shape of cut desired. The cutter spindle, while adjustable for positioning, remains fixed in operation. The work spindle head which carries the work gear, located and clamped hydraulically, operates with three distinct motions simultaneously, that is, transverse, forward and backward, and rotary. The resultant of these three motions presents the end profile of each tooth to the pencil cutter in a continuous cycle.

After the gears are machined on the forward face of the teeth, a single resetting provides for machining the teeth on the rear face of the gear. The motions of the workhead are all controlled hydraulically and by means of simple cams. A change-over merely requires a change in cams and adapters, together with a change in drive gears if the new job has a different number of teeth.

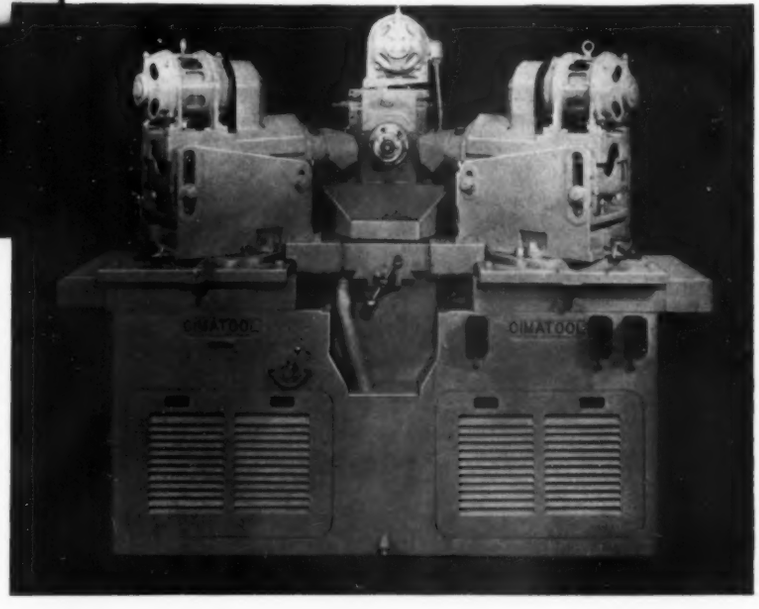
Chamfering differs from burring in that the tooth ends are given a prescribed form to facilitate a sliding mesh. The No. 105-B chamfering machine will handle practically any type of gear—spur, helical, hypoid, spline or internal—in sizes up to 25 in. diameter. It will recess, chamfer, or mill automatically any specified number and grouping of teeth. Profiles of a wide variety can be produced, ranging from the regular wedge to a combination of circular arcs.

Instead of presenting the tool to the work, the cutter spindle rotates in a fixed position, and the work is presented to the tool. It thus is possible to use heavy spindle mountings with improved cutting conditions. The cutter spindle accommodates both hollowmill and pencil cutters, as well as end mills and special cutters for a variety of different applications.

The workhead incorporates all of the mechanism necessary to the control of the machining operation. It is independently driven and its indexing movement is mechanically positive. The work gear spindle moves forward and backward in response to the rotation of a guide cam in the head assembly. Shape of this cam may be varied to provide any rate of cutting feed, and in the case of pencil cutters, an almost infinite variety of chamfers. Both cutter spindles operate simultaneously. On a ring or bevel gear, one spindle may be set to chamfer the inner face, while the other works on the outer surface.



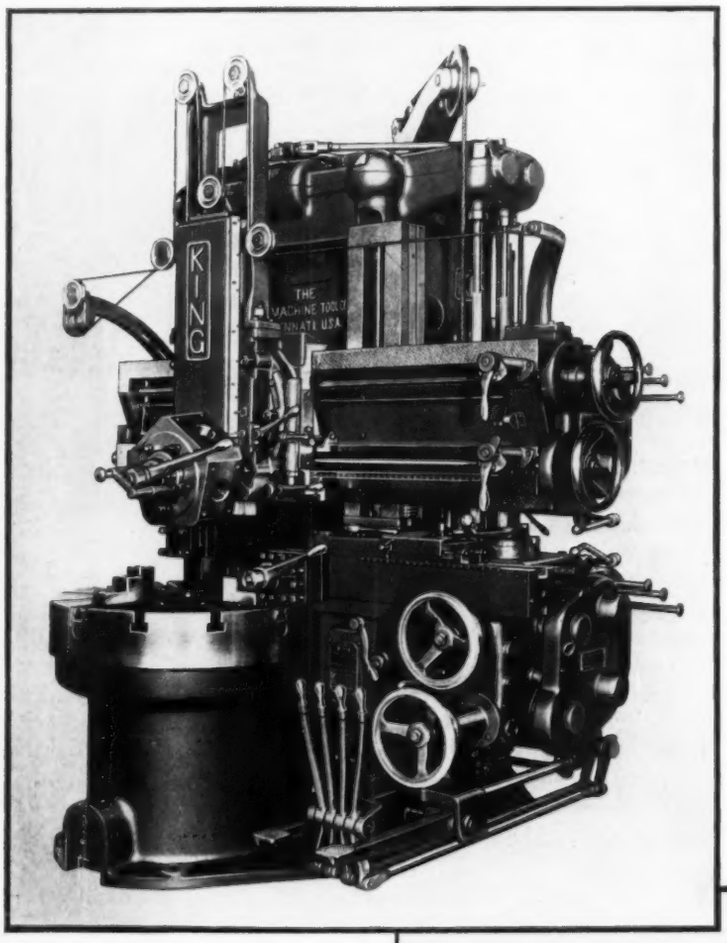
Gear teeth can be burred at the rate of 1250 per min. in the No. 200-B gear burring machine



Practically any type of gear up to 25 in. in diameter can be chamfered at the rate of up to 450 teeth per minute in the No. 105-B chamfering machine

The

King 30-in. Vertical Boring Mill Has Rapid Traverse for Each Head

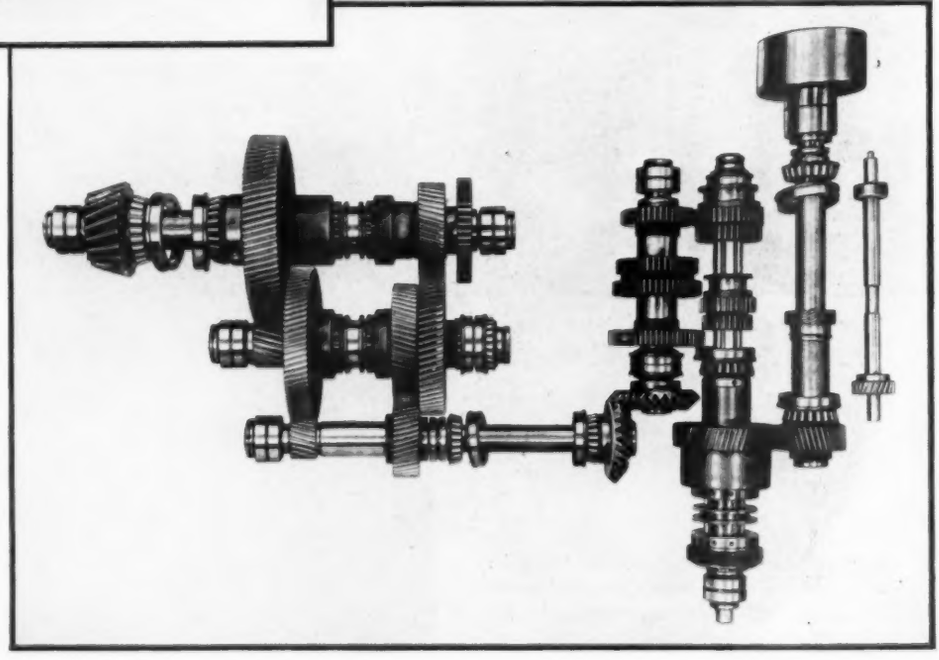


The 30-in. King side head boring mill has a maximum swing of 34 in., and has a maximum height of 24 in. under the rail. Net weight is 20,000 lb.

A 30-in. vertical boring and turning machine has been developed by the King Machine Tool Co., Winton Place Station, Cincinnati, Ohio. This boring mill is available with a plain table, a four-jaw independent chuck, or a three-jaw Universal built-in chuck. The base and column, which carry the revolving table, spindle and main drive mechanism, are cast in one piece.

The initial-drive gear box, when arranged for constant-speed motor drive, is bolted to the back of the base and affords four mechanical speed changes. It also carries the duplex multi-disc friction which controls starting and braking for the table. An oil pump for the lubricating system is located in this gear box. Speed changes are obtained through sliding gears mounted on splined shafts. When adjustable-speed motor drive is used, the initial gear box is replaced by a reduction unit, speed changes being obtained through a field rheostat. The table is started and stopped by pushsbutton control of dynamic braking. The main drive is a self-contained unit fitted in the base. Four mechanical speed changes are obtained through internal, external gear tooth type clutches, which slide on splined shafts.

Sixteen mechanical speed changes, in geometric progression, are obtained in connection with the main drive and initial drive of machines driven with a constant-speed motor. Two treadles, one for starting and



Sixteen mechanical speed changes are provided in the main and initial drive of machines arranged for constant-speed motor drive. Anti-friction bearings are used on all shafts in this drive

one for stopping the table, are placed in a position convenient for the operator.

The rail is of the narrow guard type of box construction and its lower bearing projects below the saddle sufficiently to prevent the saddle from contacting the work being machined. Cross-feed screws in the rail are mounted in ball thrust bearings.

The turret block has five tool positions and is indexed by three hardened and ground pins which collectively engage hardened and ground bushings in the turret. Two of these pins are placed below the stud on which the turret revolves, while one pin is above the stud, thus insuring accurate positioning of the turret. The only revolving member in this combination is the turret itself. Swiveling of the turret is accomplished through a worm and worm segment located on the side of the saddle. The worm segment is graduated in degrees for setting the head at an angle.

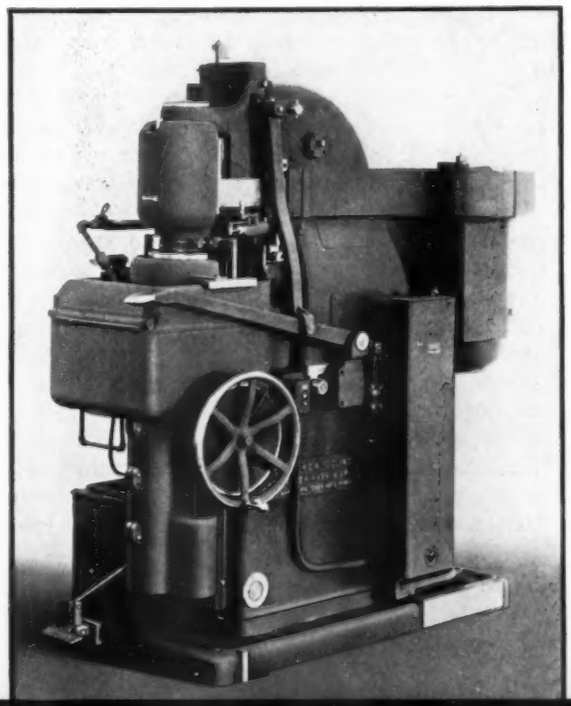
The feed is driven directly from the main drive shaft which synchronizes it with the table revolutions. Boxes bolted to each end of the rail, one box to a head, contain the complete speed, rapid-traverse and reversing mechanism. This unit provides twelve changes of feed. Feed changes are made through sliding gears and one positive clutch, which are controlled by two push-pull pins and one back lever. Power for raising and lowering the rail is provided by a separate reversing motor which also operates the rapid traverse. Rapid traverse is independent to each head, including the side head, with an interlocking device arranged so that traverse and feed cannot be engaged at once.

The side head is a non-swiveling unit, having complete feed and rapid traverse mechanisms. It is fitted directly to bearings that are integral with the base. Knockouts are provided at the outer limits of horizontal movement of the rail heads, at the highest position of the rail, and at both limits of vertical movement of the side head. A centering device is built into the rail to bring the head to a center position with the spindle of the machine. Scales are provided on the rail and on all slides. Adjustable micrometer dials are furnished on the hand adjustment lever controlling horizontal and vertical movements of the heads.

Walker Single-Stroke Grinder Has Foot Brake for Table

The improved single-stroke surface grinder offered by O. S. Walker Co., Inc., Worcester, Mass., now incorporates a foot brake for stopping the work table when operating at high speed. By using the operating lever at the right-hand side of the machine, the head can be raised or lowered quickly. The head is brought down to a stop, locked in position, and the table is raised and lowered by the large handwheel on the right-hand side. Index pointers enable the operator to set the wheel to remove a given amount of stock. An adjustable pointer permits bringing the work into position relative to the wheel to reproduce the thickness of the previous parts ground. A slight adjustment is necessary only to take care of wheel wear.

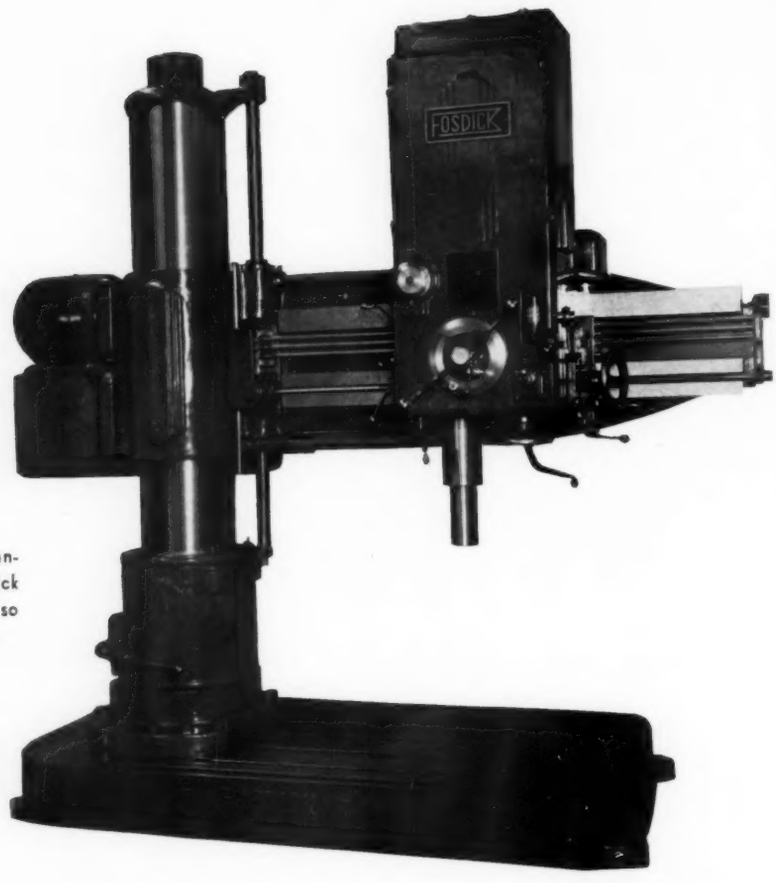
The wheelhead assembly of this improved Walker grinder can be tilted as much as 5 deg. for hollow grinding saws and cutters having hubs up to 6 in. in diameter



The wheel spindle is driven from a 10-hp. motor vertically mounted on the back of the column. Power is transmitted through a horizontal belt with a suitable binder pulley. A separate 1½-hp. motor, mounted at the rear of the machine base, drives the table. Table speeds of 60, 100 and 170 r.p.m. are provided with one set-up of the table drive pulleys, and 110, 185 and 310-r.p.m. when the drive pulleys are reversed.

When the wheelhead is lowered to the operating position, it can be locked and the feed operated by the handwheel at the right-side of the machine. When the grinding operation is completed, the wheelhead lock is released and the wheelhead returned to its idle position. Starting and stopping of the table is automatically controlled by raising or lowering the wheelhead. Moving the wheelhead also controls magnetizing and de-magnetizing of the magnetic chuck. A Fulflo pump, driven by a ¼-hp. motor, is installed in a 30-gal. tank to supply coolant.

The



The entire hydraulic mechanism of this improved Fosdick radial drill is interlocked so as to prevent any accident

Fosdick Radial Drill Has Hydraulic Controls

Hydraulic feed and hydraulic gear shift are featured in the redesigned radial drill offered by the Fosick Machine Tool Co., Cincinnati, Ohio. The hyraulic controls have been improved by the use of a hydraulic motor for raising and lowering the arm, eliminating friction clutches. This motor is interlocked with the hydraulic arm clamp so that it is impossible to operate the motor while the arm is clamped. A hydraulic safety nut has been inserted in the elevating nut and the hydraulic system for raising and lowering the arm is automatically cut off when the threads of the elevating nut are worn to one-half their original thickness.

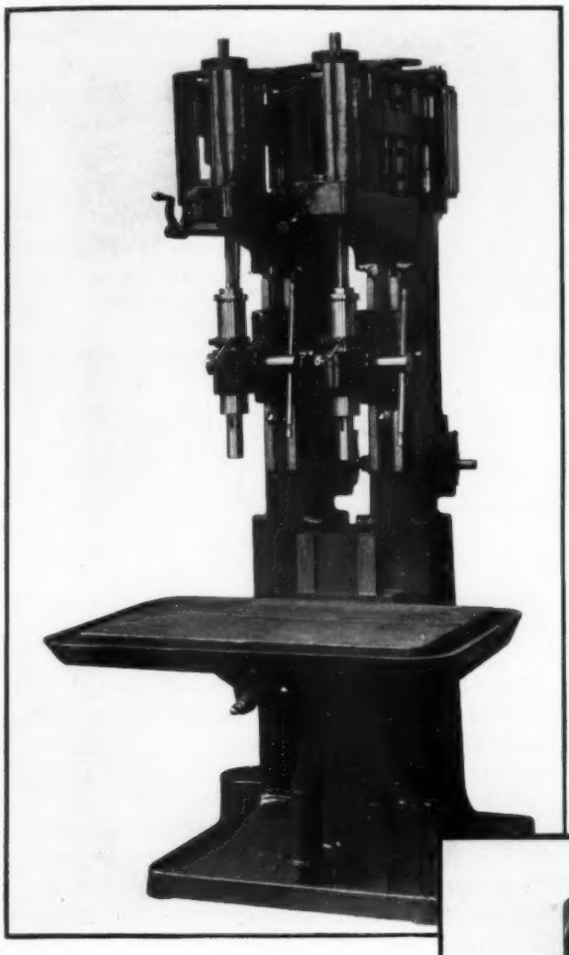
The control valve for rapid traverse has been designed to give a variable rate ranging from 0 to 20 ft. per min. A lever for opening and closing the control valve to vary the rapid traverse rate is placed on the head, convenient for the operator. The hydraulic feed is controlled by a constant volume valve and is driven by an hydraulic motor. This feed unit is placed inside the head and is controlled with a small handle placed at the lower right-hand side of the head. Feed can be change while the machine is in operation without damaging the gears or any other mechanism.

Three conventional tap leads have been embodied in the design of the head and are controlled by a lever placed at the bottom of the head.

The 36 spindle speeds now are obtained through a hydraulic shifting mechanism. A large dial, on which all of the speeds are shown, is placed directly in front of the operator on the lower left-hand side of the head. Selection can be made while the operator is drilling, permitting increased production by having the proper speed set for the next operation before the first operation is completed.

A spring counterbalance has been incorporated in the head, enabling the operator to maintain proper tension on the spindle. This counterbalance is adjustable from outside the head and can be changed to take care of the added weight of heavy boring bars and drill heads. It also is arranged to prevent the spindle from falling if the spring should break. A throw-out device has been placed in the head to prevent the spindle from feeding up or down beyond the limits of its travel.

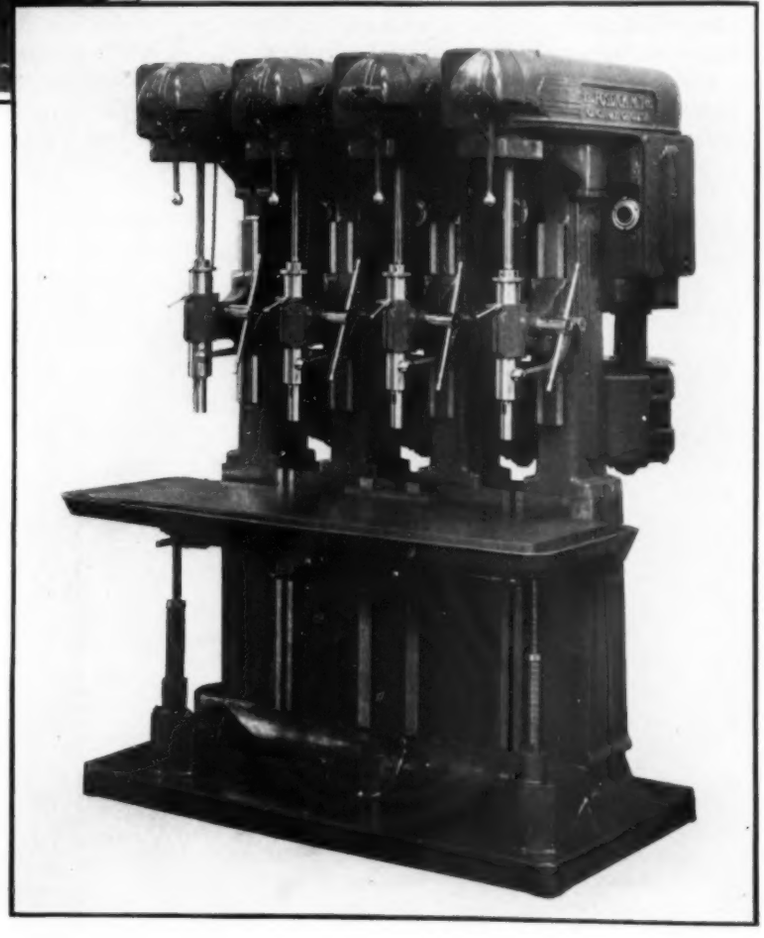
Type BM sensitive drills have been redesigned to provide 6, 9, 12 or 18 speeds. Various ranges from as low as 50 to as high as 5,000 r.p.m. are obtained. The standard machine can be furinshed with either 6 or 9 speeds with a range of either 225–1800 or 110–1800 r.p.m. Any one of twelve different speed



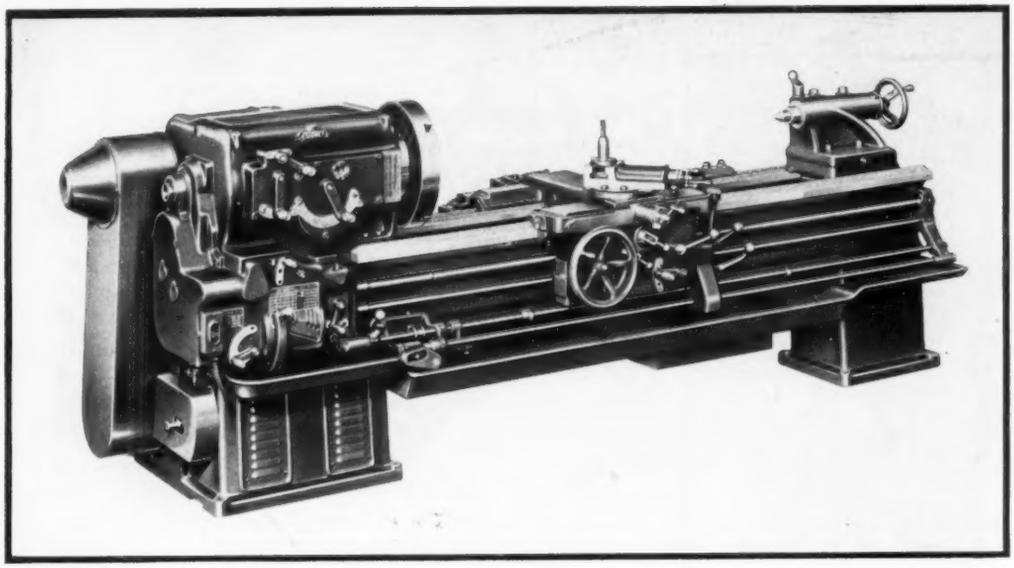
The belt shifter on this high-speed sensitive drill automatically releases the tension on the belt before shifting

ranges can be incorporated in the head. The standard Type BM drill requires a single-speed 1800 r.p.m. motor. Between the motor and the V-belt drive is a gear box integral with the top bracket. Shafts in this box run in anti-friction bearings. A plunger-type pump, placed directly underneath the gear box, forces oil to all bearings and gears in this transmission. A two-speed motor may be employed to give a wider range of spindle speeds than is provided by the transmission. Control for the motor is mounted in a sealed casing back of the lower pedestal, a pushbutton being mounted at the front of the top bracket directly in front of the operator. Power feed available for these machines is arranged so that it engages by the downward movement of the handwheel and disengages with the withdrawing of the drill. An automatic depth stop is available for each spindle.

Lubrication of the spindle drive gears is incorporated in the improved No. 4 and No. 5 high-speed ball bearing sensitive drills offered by Fosdick. Also, the width of the flat belt used has been increased to 2 in. on the No. 4 machine, and to $2\frac{1}{2}$ in. on the No. 5 drill. Standard features, such as power feed, tapping attachments, cutting lubricant systems and automatic belt shifter are incorporated in these sensitive drills.



Spindle speeds as high as 5,000 r.p.m. can be obtained on the No. 4 and No. 5 Type BM sensitive drills



This 18 x 72 in. Sidney lathe has a 16-speed herringbone geared headstock fitted with anti-friction bearings

Sidney Lathes Have Herringbone-Geared Headstocks

The improved engine lathes announced by The Sidney Machine Tool Co., Highland Ave., Sidney, Ohio, are equipped throughout with anti-friction bearings, and are available in sizes from 14 to 36 in. swing in either 8, 12 or 16 speed headstocks. Ample lubrication is assured through the use of central reservoirs, pumps and piping to lubricate automatically the headstock, apron and carriage mechanisms.

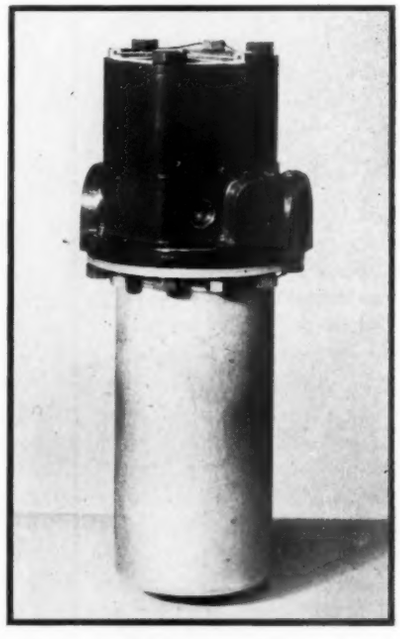
Herringbone gears are used in the headstocks, internal and external gear tooth clutches being used for speed changing. Smoother action is claimed through the use of herringbone gears, thus eliminating all gear tooth marks on the work with no end thrust throughout the transmission. By having the herringbone gears constantly in mesh, a minimum amount of backlash is necessary to insure smooth, chatter-free operation.

A center bearing is provided on both the spindle and the intermediate shaft to increase the rigidity of the headstock, thus eliminating vibration under the high speeds and feeds commonly used. Beds for these lathes have four longitudinal walls with cross girts based at 12 in. intervals. These are supplemented by additional girts between the longitudinal walls.

Cuno Lubricant and Coolant Filter Automatically Self-Cleaning

A completely automatic self-cleaning filter for lubricating oil, hydraulic oil, cutting oil and grinder coolant has been announced by The Cuno Engineering Corp., Meriden, Conn. Continuously cleanable filters, employing the "Auto-Klean" principle of edge filtration, have long been used on leading machine tools. On previous models, cleaning is accomplished by turning the external handle at periodic intervals. The filter cartridge is thus rotated past stationary cleaner blades which extend into the slots between disks and rejects all accumulated solids.

On the automatic model, the cartridge is turned continuously by an oil-driven motor mounted in the



An oil-driven motor contained in the filter head drives this continuously self-cleaning oil filter designed for machine tool applications

filter head. Driving force for the motor is obtained from the differential pressure between the discharge and suction side of the oil pump. The reciprocating motion of a piston operating in a cylinder is converted to rotary motion turning the cartridge continuously. A toggle device for valving the oil to the piston reverses the oil flow to the piston, thereby eliminating the possibility of a dead center position of the piston and valve. The entire motor mechanism is immersed in oil. There are no glands or packing, and no adjustments to be made to the filter or turning mechanism.

The model shown is designed for external mounting. A self-turning unit also is available without sump for flanged mounting, the filter element extending into the oil sump of the machine. On such built-in installations, external pipes are not necessary.

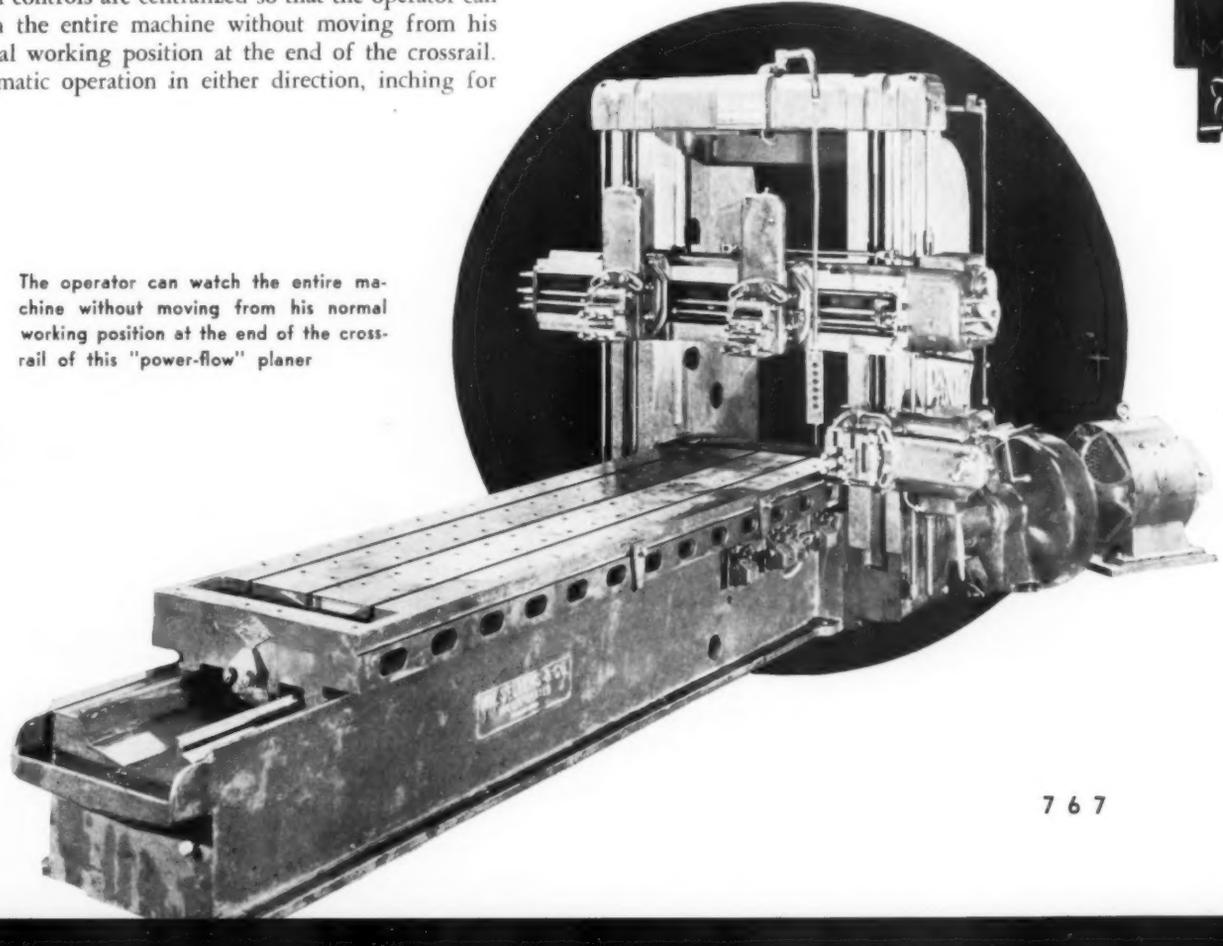
Sellers "Power-Flow" Planer Has Centralized Controls

A number of features have been incorporated in the "Power-Flow" planer by William Sellers & Co., Inc., 1600 Hamilton St., Philadelphia, Pa., to increase the adaptability and ease of control of this planer, as well as to provide a high degree of accuracy. Besides the Sellers spiral gear drive, the principal features include compensating table ways which eliminate climbing of the table caused by unequal expansion of the table and bed; a new tool apron which is designed with horizontal tee slots its full width to provide for a variety of tool positions; a table abutment plate support which incorporates an adjustable feature; a tool slide so designed that two-thirds of its travel is below the crossrail with full length bearing surface at every point of its travel; centralized micromatic controls; extended back crossrail which has two extra bearing supports; anti-friction bearings throughout; and force-feed lubrication with independent powered pump.

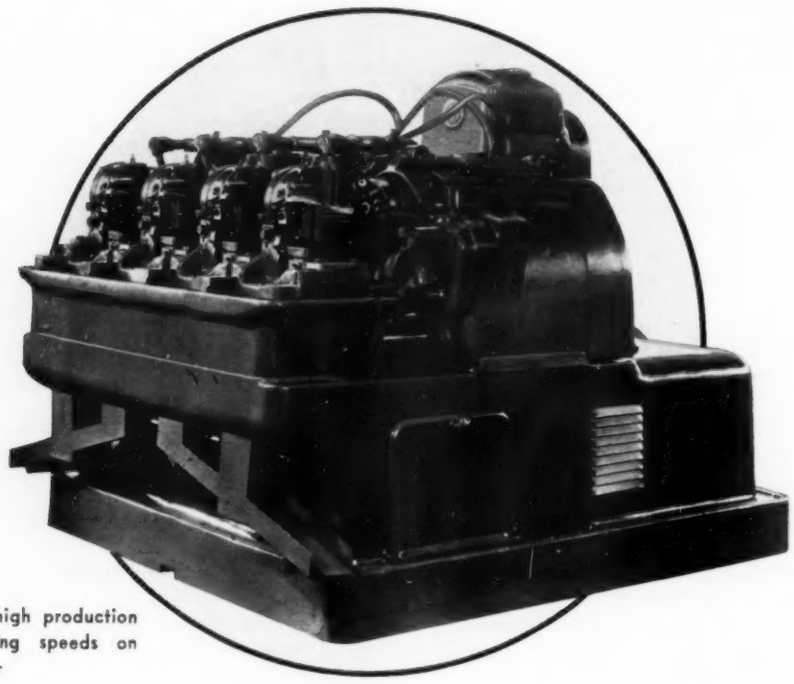
All controls are centralized so that the operator can watch the entire machine without moving from his normal working position at the end of the crossrail. Automatic operation in either direction, inching for setting the work, starting feed, and the like, can be controlled from a pendant pushbutton station. Power feed and traverse controls for the railheads are on the feed traverse box at the end of the crossrail.

Rail elevation is accomplished by pulling downward a lever positioned on the right-hand side of the machine. Turning this lever one way or the other gives direction of movement. It is thus only a one-handed operation and can be accomplished in a position which allows the operator to watch his work.

The standard railheads of the "power-flow" planer have 64 feeds ranging from 1/64 to 1 in. The railhead slides have 64 feeds ranging from 1/128 to ½ in. The heads have 64 vertical feeds ranging from 1/64 to 1 in. With a 4-to-1 constant voltage motor, cutting speeds ranging from 25 to 75 ft. per min. and return speeds from 50 to 100 ft. per min. are obtained.



The operator can watch the entire machine without moving from his normal working position at the end of the crossrail of this "power-flow" planer



Indexing turrets permit high production threading at low cutting speeds on this four-spindle threader

Landis Machine Four-Spindle Threader Uses Indexing Turrets for High Production

Applicable to almost any kind of threading operation within its diametrical capacity of $\frac{1}{4}$ to $\frac{7}{8}$ in. inclusive, the four-spindle semi-automatic threading machine manufactured by the Landis Machine Co., Inc., Waynesboro, Pa., provides production possibilities which are limited only by the speed of its operator. During the production trials the machine has threaded more than 1,900 hollow-head setscrews per hour with an actual cutting speed of less than 35 ft. per min. This slow-cutting speed assures good thread quality and long chaser life, even though the material being threaded may be tough, heat-treated alloy steel.

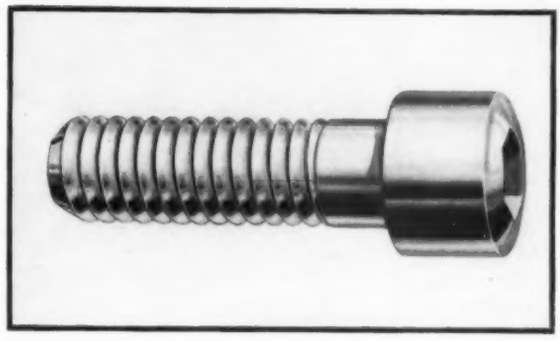
In operating this machine, it merely is necessary for the operator to load the small driving mandrels which carry the screws to the threading position. The die head advances, completes the threading operation, and returns to its original position, after which the indexing fixture rotates to bring a new piece of work into the threading position. During this next threading operation, the threaded screw automatically is ejected from its mandrel and the operator reloads at the fourth position.

This machine is equally adaptable for long rods, bolts, capscrews and other parts, where these parts must be handled on a high-production basis. The turret used when threading hollow-head setscrews can be replaced easily with holding fixtures for bolts or special threaded parts, or a gripper mechanism can be substituted for the turret or fixture if long rods or bars are to be threaded.

Allen Forms Socket-Head Capscrews By New Process

The Allen Mfg. Co., 133 Sheldon St., Hartford, Conn., now is shaping socket-head capscrews by a recently developed "Pressur-Formd" process making it possible to divert the normal layer of the fibers, which is parallel to the axis of the bar of steel, so that they conform to the general contour of the screw in an unbroken flow from the point to the head. The fibers are turned in at the top of the head toward the socket so as to increase resistance to wrench torque. Design of the cold-drawing dies assures a burnished head with the diameter held to close tolerances. There is claimed to be good concentricity between the head

and the threaded body of the screw, and the under side of the head is trimmed to lie flat on a plane surface. These screws are threaded in fully automatic, specially designed threading machines to provide accurate and smooth burnished threads. Pitch diameter is maintained within Class 3 tolerance limits. Heat-treatment is controlled automatically.



In "Pressur-Formd" socket head capscrews, the normal layer of fibers are diverted to conform to the contour of the screw

Collets and Attachments Interchangeable On Hardinge Lathes and Second-Operation Machines

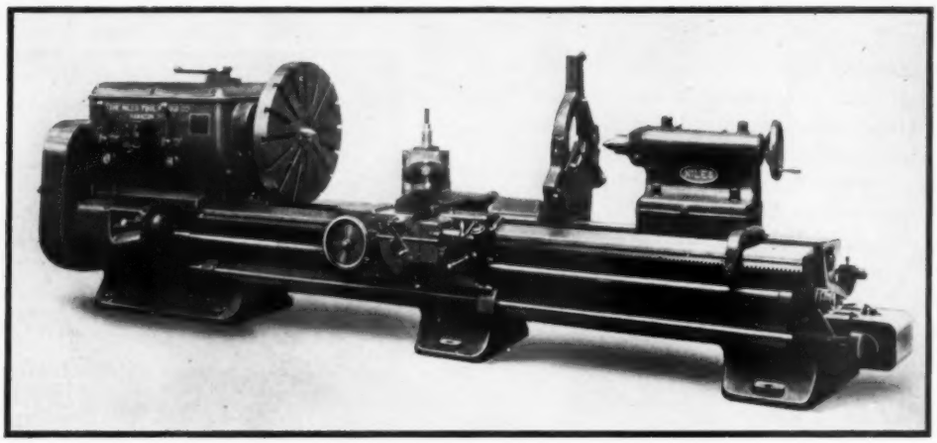
Accuracy, convenience of control, wide speed range and interchangeability of collets, spindle nose and bed attachments on high-speed lathes and second-operation machines are offered by Hardinge Bros., Inc., Elmira, N. Y. The 9-in. swing 1-in. collet capacity precision high-speed lathe shown is mounted on a welded steel pedestal which incloses the motor, controls, driving unit and provides cabinet space for the storage of chucks, tools, collets and other attachments. The pedestal has foot space for the operator and there are openings at each end at the floor to facilitate moving. Provision for bolting the machine to the floor is made inside the pedestal base.

Eight spindle speeds forward and reverse, ranging from 230 to 3,900 r.p.m. are effected by the motorized driving unit in the base. A standard 2-speed ball bearing motor is V-belt connected to a four-step aluminum pulley. The motor has rubber cushions and is mounted on a hinged bracket which also rests upon a rubber cushion. A lever arrangement raises the motor to permit quick positioning of the V-belt on the four-step pulley. Three V-belts connect the drive shaft with the headstock spindle.

A similar pedestal-type base is used for the precision high-speed second-operation machine, which also has a 9-in. swing and a 1-in. collet capacity. The eight spindle speeds forward and reverse range from 150 to 3,900 r.p.m. on this machine. Both machines have complete oil equipment built into the pedestal base. A number of attachments are available for precision production work on this machine. Both machines have a 36-in. long bed.

Eight spindle speeds forward and reverse are obtained from the drive unit mounted inside the cabinet space of this high-speed lathe

This 9-in. swing high-speed second-operation machine has a 6-in. step chuck capacity and can be arranged with a number of attachments to speed production operations



Thirty-two of the 48 feeds on this 30-in. Niles lathe can be secured without changing gears mounted at end of the headstock

Niles 30-in. "Time Saver" Lathe Has Anti-Friction Bearing Spindle

An improved 30-in. "Time Saver" lathe, in which the spindle and all shafts are completely equipped with anti-friction bearings, is offered by Niles Tool Works Div., General Machinery Corp., Hamilton, Ohio. Drive is through multiple V-belts from a motor mounted on an adjustable base and located on the rear of the machine. All headstock gears are hardened and ground.

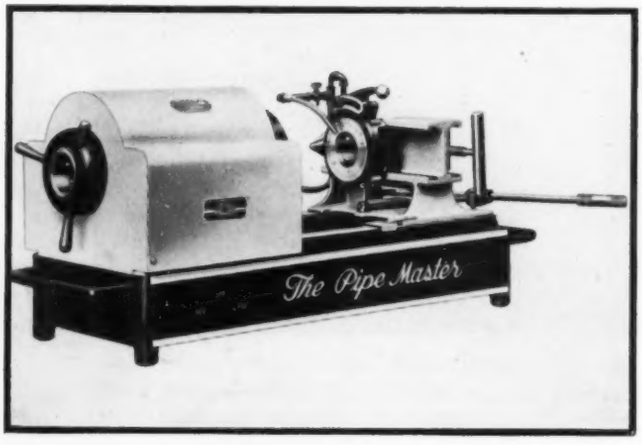
Spindle speed changes are through sliding gears and positive tooth clutches. The shifts are made by means of levers at the front of the headstock, a direct-reading index plate showing at a glance the correct setting for the speed desired. Spindle speeds range from 3.94 to 232 r.p.m. in twelve steps. The lathe provides 48 feeds ranging from 1/64 to 1 in. per rev. The model shown has a 16-ft. bed length and takes 8 ft. between centers. It weighs approximately 20,000 lb.

Motor control is located on the carriage, on d.c. machines, by means of the same controller, the spindle speeds can be varied throughout the full range of the motor without leaving the carriage. Power rapid traverse for the carriage can be furnished. A single lever for engaging either cross or longitudinal feed simplifies control. A coolant attachment can be provided. The coolant is delivered through a flexible hose to the carriage, once it is returned by way of the steel pan at the back of the bed to a settling tank.

Improved Oster Pipe Threaders Have Inclosed Motor Drive

Driven by a variable speed, reversible ½-hp. universal motor, the No. 502 portable "Pipe Master" machine, developed by the Oster Mfg. Co., 2057 E. 61st Place, Cleveland, Ohio, has a range covering all sizes from ¼ to 2 in. through its spindle, and is capable of driving geared die-stocks up to 6 in. capacity through a special drive shaft. A gliding, floating-type die-head, with reamer built integral, is used. The machine is of the front-cutting type and this, in combination with the extended jaw front chuck, makes it possible to handle very short lengths of pipe without using a nipple chuck. The cut-off device uses standard cutter disks and rollers and is fast in operation. The front chuck is a universal, bar-operated gripping chuck, while the rear chuck is of the wheel-operated centering type which does away with pipe bushings and outboard pipe supports. A reversible oil pump, with relief valve in the line, supplies cutting oil to the threading dies and cut-off device. This machine is 19½ in. wide, and 46 in. long.

The improved No. 531 "Tom Thumb" bolt ma-



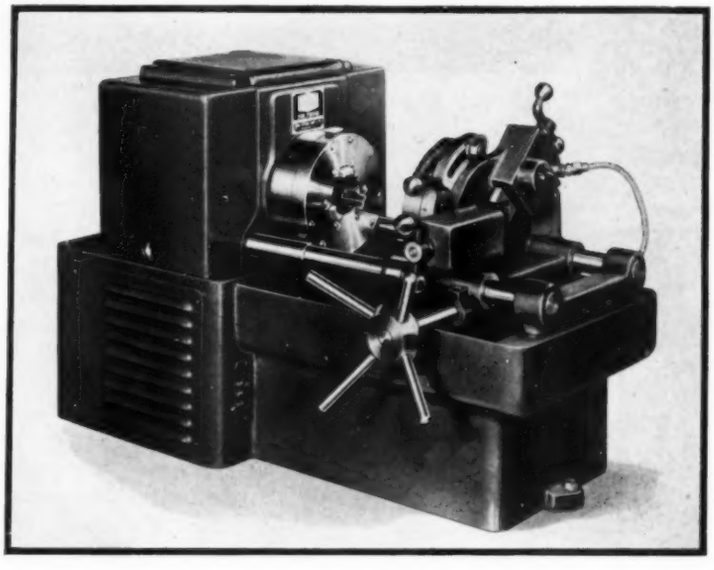
Fast in operation, the No. 502 pipe machine is easily portable

chine has capacity for threading bolts and other solid stock up to 1¼ in. diameter for National coarse thread and up to 1½ in. diameter for National fine thread, as well as pipe and nipples up to 1¼ in. This machine has a ball-bearing mounted spindle, worm and shafts, and is driven by a ½ hp. reversible, variable-speed Universal motor through V-belts.

For quick handling of bolts and solid stock, this machine is equipped with a rotary die-head and open type vise. A stock-stop and automatic trip are provided, as is an emergency hand-trip. The automatic trip opens the die-head when the thread has reached any desired length. The spindle on which the die-head is mounted is hollow, so that threads of any length may be cut. Solid steel bars supported at both ends form the ways on which the vise and its carriage are mounted. The machine weighs 450 lb., is 28 in. high, 20¼ in. wide, and 40 in. long.

Having capacity for all sizes of pipe from ½ to 2 in., inclusive, the No. 562 A "Tom Thumb" pipe machine is capable of driving geared die stocks up to 8 in. capacity through a special universal shaft. An improved die-head, which is integral with its carriage, is used with high-speed steel threading dies. The die-head is of the front cutting type and lengths as short as 2½ in. can be threaded without the use of a nipple chuck. Size cutting marks are on top of the die-head where they are plainly visible for easier, more accurate cutting. An internal oiling system to the dies and cutoff unit is provided.

This machine is equipped with a built-in lathe type cutoff attachment operated by a ball crank handle and opposed by a V-block steady rest. A combination reaming and chamfering tool, mounted on the cut-off block, does both operations simultaneously. Height of this machine is 23¼, width is 23 in., and length is 36 in. Net weight is 450 lb. The unit can be mounted on a bench or on a standard portable all-steel stand. It is powered by the same size and type of motor as is used for the No. 531 machine.



The spindle of the No. 562 pipe machine, mounted in ball bearings, is driven by a ½-hp. motor

Solid stock up to 1½ in. diameter can be threaded in the No. 531 bolt machine

The

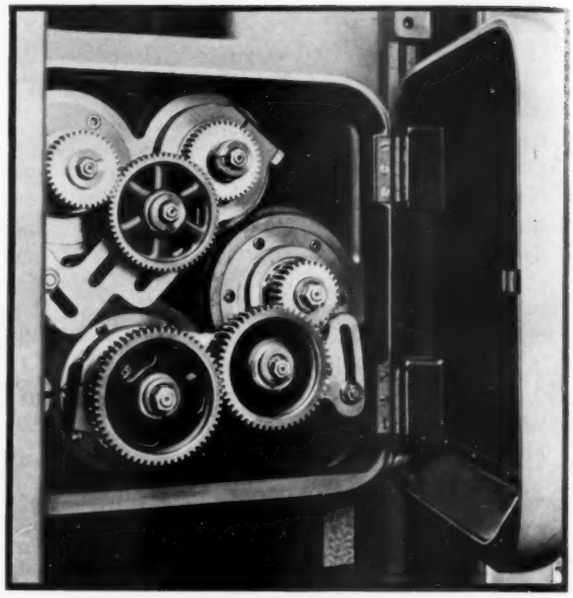
Automatic Cycle and Hydraulic Control Featured in Type V Barber-Colman Hobber

High accuracy and fine finish are claimed for the Type V vertical hobbing machine recently developed by Barber-Colman Co., Rockford, Ill. This machine features vertical design, automatic operating cycle, and hydraulic control of mechanical actuation. Advantages claimed for the vertical design are conservation of floor space, complete accessibility from front and rear, high strength and rigidity. Chips and coolant fall directly into a chute below the hob.

The machine is arranged so that speed, feed and index gears can be selected quickly and mounted easily. Simple adjustments establish depth of cut and movement of work slide. Central controls give the operator complete command of individual movements in the cycle.

The automatic operating cycle employs hydraulic pressure for actuating the hob carriage, clutches and clamping mechanism; mechanical drives to the hob spindle and screw feed; electrical drives to the hydraulic unit, coolant pump and work slide rapid traverse. The cycle includes rapid traverse with conventional or climb cutting as determined by setting the controls.

Hob slide is compact, has a sturdy support, and is clamped hydraulically against a positive stop during the hobbing operation. Hob-spindle slide is dovetailed in a large diameter swivel base which has worm-and-wheel vernier angular adjustment. The hob spindle is mounted in precision independently-adjustable bronze bearings. Drive to the spindle is reversible. Micrometer adjustment of the positive stop insures precise depth of cut and easy duplication of cut.

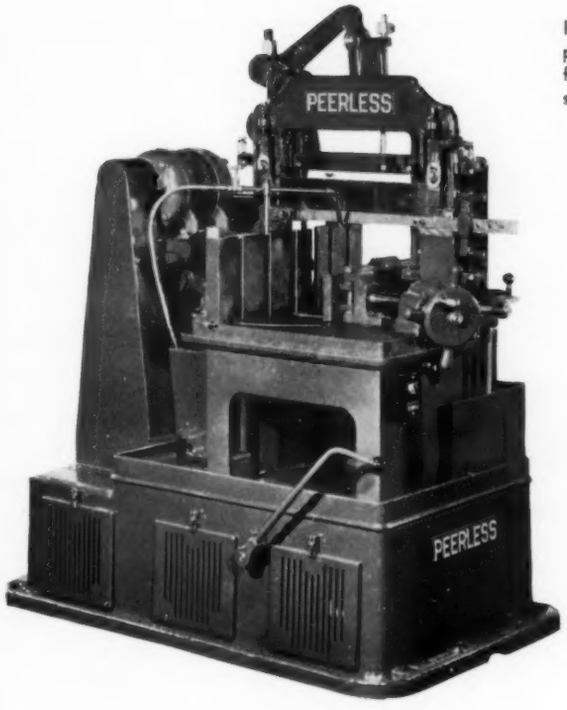


Feed and differential gears are in an oil-tight compartment at the front of the Type V hobber

Designed for quality production of gears on long runs, the Barber-Colman Type V automatic hobber uses in combination hydraulic pressure, mechanical drives and electrical drives

Grouping of controls and gages in a convenient position at the front of the machine gives the operator complete command of all functions for set-up and operation. Once the machine has been set up, it is necessary only for the operator to move a lever starting the automatic cycle which stops when the cut has been completed and the slide returned to the loading position. Hob and work can be rotated independently of other movements for convenience during set-up. Gages on the control panel indicate pressure in the automatic lubricating system and in the hydraulic system actuating machine movements.

Specifications: Capacity, 8-in. max. diameter, 9-in. max. face, 4 diametral pitch in steel; maximum travel of work slide, 10 in.; maximum distance between center lines of work and hob spindles, 6⅛ in.; maximum hob diameter, 4 in.; maximum hob length, 4 in.; hob spindle slide axial adjustment, 2½ in.; range of nine hob spindle speeds, 73 to 307 r.p.m.; range of feed per rev. of work, 0.015 to 0.200 in.; motor recommended, 5 hp.; floor space occupied by base, 38 x 57 in.; height, 86 in.; net weight, 8,950 lb.



Hydraulic feed on this 10 x 10 in. Peerless hacksaw permits yielding to changed conditions, whether from gradually dulling of the blade or a hard spot encountered in the metal

Peerless Hacksaw Has 10 x 10 in. Capacity

The 10x10-in. improved high-duty power hacksaw offered by Peerless Machine Co., 1615 Racine St., Racine, Wis., incorporates an hydraulic feed. The machine has a 6-in. stroke and uses $1\frac{1}{4}$-in. wide saw-blades, ranging from 14 to 18 in. long. Where large quantities of bar stock are to be cut, an hydraulically operated automatic bar feed can be fitted to this machine. Without the bar feed, the machine has a capacity for cutting 6-in. round or square stock at 45 deg. Angular cutting cannot be done on the machine when equipped with the automatic bar feeding equipment.

The machine has a positive lift of the blades on the non-cutting stroke by means of hydraulic pressure. This lift is approximately $\frac{3}{32}$ in. At the completion of a cut the machine stops automatically and an automatic lifting device raises the saw frame up and away from the work. This is done hydraulically. A height and depth gage permits automatically stopping at any point in the work.

A totally inclosed three-speed sliding gear transmission provides approximately 60, 100 and 140 strokes per min. All shafts in this transmission are mounted in anti-friction roller bearings. Motor is mounted on the machine and connected to the transmission by three V-belts which are inclosed in a sheet metal guard. When fitted with an automatic bar feeding unit, the bar feed, chuck and length gage indicator all are operated hydraulically.

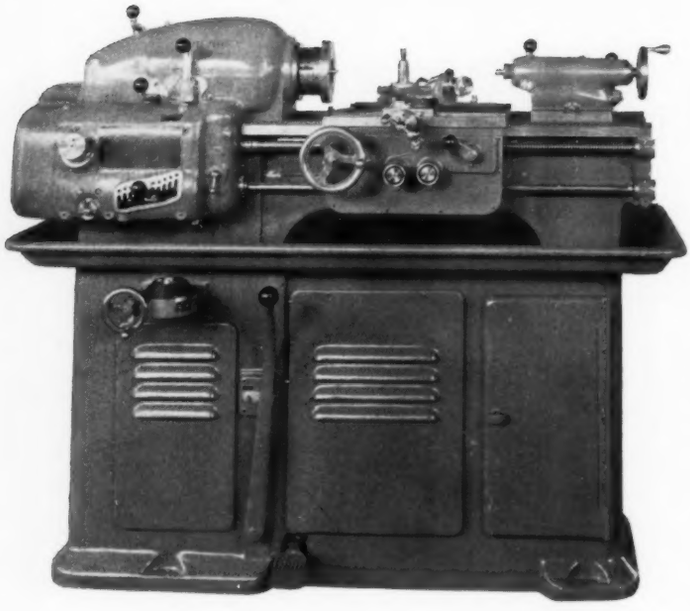
Specifications: height from floor to vise table, $34\frac{1}{4}$ in.; height over-all, 66 in.; floor space required for plain machine, 36 x 57 in.; floor space required with standard 12-ft. conveyor and automatic bar feed, 57 x 205 in.; standard automatic length gage capacity, $\frac{1}{8}$ to 18 in. inclusive. The length gage can be furnished with capacities to 24 in., 36 in., or longer if required.

Arter Rotary Surface Grinder Has Ball Bearing Spindle

The Model D rotary surface grinder developed by Arter Grinding Machine Co., 15 Sagamore Road, Worcester, Mass., incorporates a hydraulically traversed wheel head. The wheel spindle vertical axis is central with the ways of the wheel slide, thus affording increased stability to the spindle mounting. Drive to the wheel spindle is by short multiple V-belts from a motor mounted on the wheel slide. As the pulley is at the spindle end, belt adjustment and replacements are made easily and quickly.

The chuck spindle is mounted, top and bottom, in super-precision preloaded, double-row ball bearings. Drive is by worm and worm wheel connected by V-belts to a variable-speed electric motor. Elevation is by handwheel, and automatically by a hydraulic cylinder controlled from the wheel slide. Automatic elevation can be secured at either or both ends of the stroke. All operating controls are conveniently located and all electric controls are in a single panel, flush-mounted in the machine base.

Ball bearings are used on both the wheel and table spindle in this Model D grinder



Infinitely variable spindle speeds ranging from 40 to 2,000 r.p.m. are obtainable on the 10-in. swing Hendey toolmakers' lathe

Hendey Toolmakers' Lathe Speeds Precision Work

A high-speed sensitive precision tool and gage makers' lathe, made to meet the demand for a lathe heavier and of greater adaptability than the standard bench lathe, is offered by the Hendey Machine Co., Torrington, Conn. This lathe has a working range of spindle speeds of 40 to 2,000 r.p.m., any speed within this range is obtainable. The speeds from 500 to 2,000 r.p.m. are through multiple V-belt drive direct to the spindle without using gears. The lower range of speeds from 40 to 500 r.p.m. is obtained through back gears having a low pitch line velocity.

Spindle is mounted on super-precision anti-friction bearings at both ends, with the front bearings preloaded. Starting and stopping of the spindle are controlled through a multiple disk clutch and foot brake. A size D1-4 cam-lock spindle nose is provided. Hole through the spindle will take $1\frac{1}{2}$ in. diameter bar stock and the spindle collet capacity is $1\frac{1}{8}$ in. diameter round stock.

The lathe is provided with two ranges of feeds, one through belt from the spindle, and the other through regular gearing for thread cutting. The feeds through gearing are from 0.002 to 0.120 per in. while the belt-driven feeds are from 0.001 to 0.060 per in. The quick-change gear box gives 66 changes of threads and a like number of feeds for either belt or gear drive. On the index plate, the 66 threads range from 2 to 120 per in. without duplication. The accessibility of the pick-off gear sector permits combinations in change gears to any reasonable degree.

Apron of this lathe is of the conventional type with power cross and longitudinal feeds friction operated, and with interlock between thread cutting and longitudinal feed to prevent simultaneous engagement. Taper attachment will turn 9-in. at one setting and in any position on the bed. The taper attachment has a vernier at both ends of the bar for setting to $\frac{1}{16}$ in. and $\frac{1}{4}$ deg. of taper per foot.

Principal dimensions are: swing over ways, $10\frac{1}{4}$ in.; swing over cross slide, $5\frac{1}{2}$ in.; tailstock spindle travel, 5 in.; cross slide travel, $5\frac{3}{8}$ in.; compound rest slide travel, $2\frac{3}{4}$ in.; net weight, 2,480 lb.; height of centers above floor, $45\frac{3}{4}$ in.

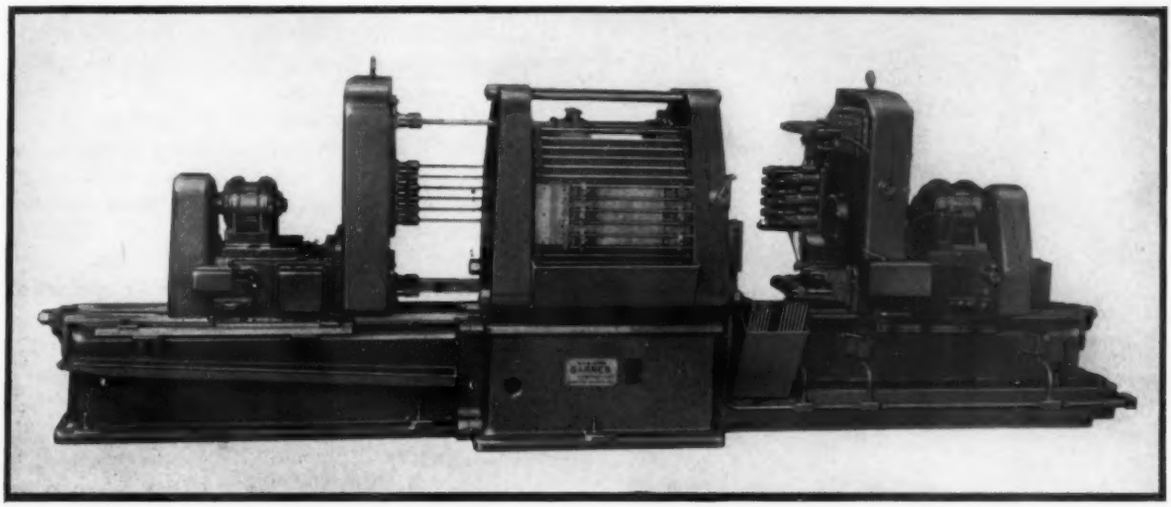
Rifle Barrels Reamed Automatically In W. F. and John Barnes Machine

One operator can produce about 100 rough, semi-finish and finish reamed rifle barrels per hour in any calibre of bore from 22 up to and including 50 calibre in this reaming machine developed by W. F. and John Barnes Co., 301 S. Water St., Rockford, Ill. Stroke and fixture are adjustable to accommodate barrels ranging from 24 to 32 in. over-all length.

Reaming tools of special design are fed through the bore by feeding the right-hand head away from the fixture, pulling the reamers through the bore. The function of the left-hand head is to carry the reaming tools back to the starting position and rapid traverse them to a point where the right-hand head chucks can grasp the long pilot and pull the reamer through for another reaming operation. Chucking and transferring of reaming tools is automatic.

The reamers are rotated by the right-hand head as it pulls them through the bore. After the reamers have been fed completely through the bore, spindle rotation automatically stops and the trunnion is hand-indexed 45 deg. to align the return tubes opposite the reamers. The right-hand head then rapid approaches and places the reamers into the return tubes, pushing them through to the opposite end, where they are automatically picked up by the left-hand head and traversed through the tubes so that the trunnion can again be indexed. After this second index, the trunnion is brought into the next position and six finished reamed barrels are unloaded.

Two self-contained hydraulic sliding head units are used on this machine. The right-hand head furnishes feed for reaming, as well as rapid traverse and drive



This automatic reaming machine features power return of reamers through guide tubes

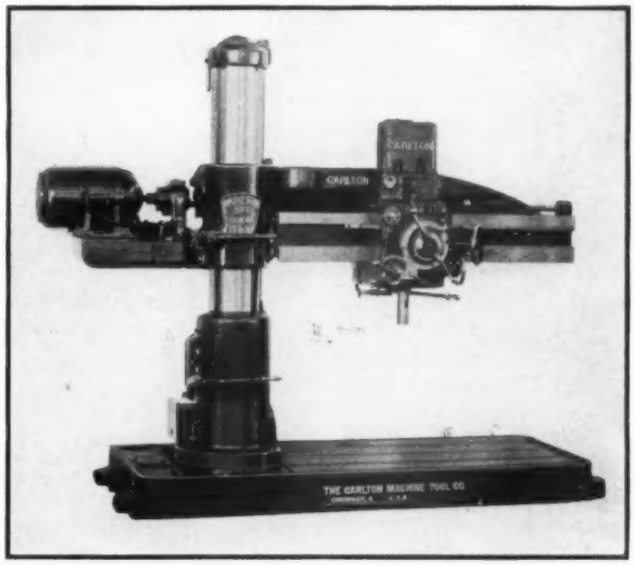
to the reaming spindles. The left-hand head is similar except that no spindle drive is required. These sliding heads incorporate hydraulic control consisting of a constant delivery rapid traverse pump and variable delivery feed pump. They are coupled with a standard control valve to insure uniform feed to the reamers, irrespective of variation in fluid pressure.

Coolant is applied directly to the cutting edge of the reamers through the center of the pilots on the reaming tools. These are supplied through the feed collets on the right-hand head. Coolant flow is interlocked to automatically start and stop with spindle rotation. The eighteen driving spindles are mounted in anti-friction bearings and incorporate hydraulically-operated chucks. The pick-up spindles on the left-hand head are similar to the driving spindles, except spring type chucks are used for picking up the reamers. Electric interlocks are provided to prevent damage to the work through improper operation of the machine. Four pushbuttons and one lever control all of the movements of the machine. Similar machines can be arranged for other products.

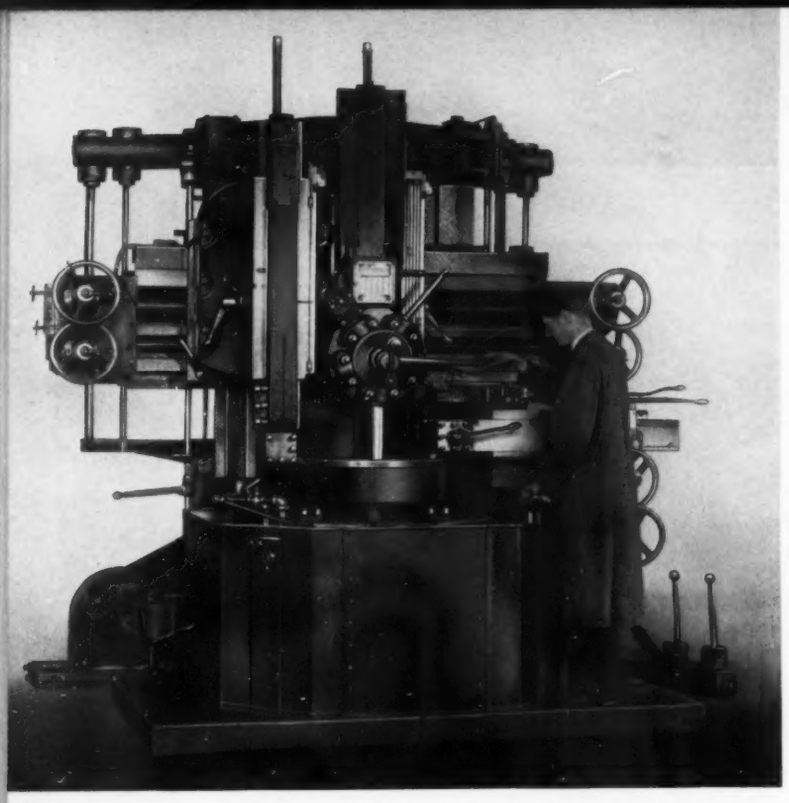
Carlton Radial Drill Useful on Light Work

The Type 1A, 11-in. diameter column, radial drill offered by The Carlton Machine Tool Co., Cincinnati, Ohio, can be furnished in arm lengths of 3, 4, 5 and 6 ft., and is provided with a 12-speed head. This head is the same as that furnished on the standard 9-in. diameter column radial drills, instead of the 24-speed head regularly furnished on the 11-in. diameter column, Type 2A radial drill. The machine is especially designed for those jobs where the majority of holes to be drilled are less than 1-in. in diameter and will take any size of work within the capacity of a 5 hp. motor.

The Type 1A radial drill is furnished with a hardened steel armway, and with the head mounted on ball bearings rolling on this armway. All gears are of alloy steel, with hardened and ground teeth. The low-hung drive to the spindle permits the driving gear to be mounted on the largest diameter of the spindle at a point close to the cutting tool. All controls on this machine are concentrated within easy reach of the operator. Automatic lubrication is provided throughout the head.



Developed for work requiring drills less than 1 in. in diameter, this Type 1A Carlton radial drill is furnished with arms ranging from 3 to 6 ft. in length



Single levers, within the handwheels, control transverse and feed to each head

Bullard "Cut Masters" Have Speed Range For Carbide Cutting Tools

Built in five sizes—30, 36, 42, 54 and 64 in.—an entirely new line of vertical turret lathes by the Bullard Co., Bridgeport, Conn., has a range of speeds and feeds designed to get the utmost out of modern carbide and other cutting tools. With the exception of the two smaller sizes, which are designed for two heads, the "Cut Masters", as these machines are designated, carry three heads—left-hand main ram head, a right-hand main turret head and a side head. However, any choice of heads is available to meet the requirements of individual cases.

All heads and functions of the machines are protected by interlocking switches, so that it is almost impossible to damage the machine through careless handling. Either rail head may be swiveled 30 deg. either side of vertical. The two main heads are provided with screw feed, both horizontal and vertical, assuring extreme accuracy and fine finish.

Traverse and feed control are combined in one lever in the center of each handwheel, one for the turret slide and another lever for the saddle movements. An interlock prevents feed and traverse from being engaged at the same time. The power traverse control provides individual or simultaneous action for the vertical and horizontal movement of both main saddles and rams, as well as the side head and its ram. Each head has its own feed works which functions irrespective of the others; feed changes are easily made without stopping the machine.

Electric stops for feeds of all heads in any direction enable feed stop-off when approaching finished dimensions. Moving members are equipped with fixed precision switches which contact adjustable trip dogs at any desired setting. This action closes the circuit which, by reacting on Thrustors, disengages the feed. On the turret head there is a selector bar which permits the setting of separate trip dogs for each turret station.

Cut Masters are provided with sixteen changes of feed and twenty changes of speed, all in geometric ratio. A 25 per cent higher spindle speed range can be provided if desired. Speed changes are made by two ball shift levers to the right of the machine. The clutch and brake lever is located above the side head and moves with it.

Binder bolts and levers are provided for the rail and other sliding members, but because of the rigid construction, it is not ordinarily necessary to use these. The high speeds of these machines are obtainable through the use of Timken bearing spindle mounts for the table and other key positions. Positive pressure filtered lubrication throughout the machine and anti-friction bearings at other points give long life with minimum maintenance, even under heavy cuts and high speeds.

New design chucks minimize friction within the mechanism, providing maximum jaw pressure with low wrench effort. These chucks are available in three-jaw universal or four-jaw independent types having conventional T-slots for securing jaws, fixtures, clamps and other devices.

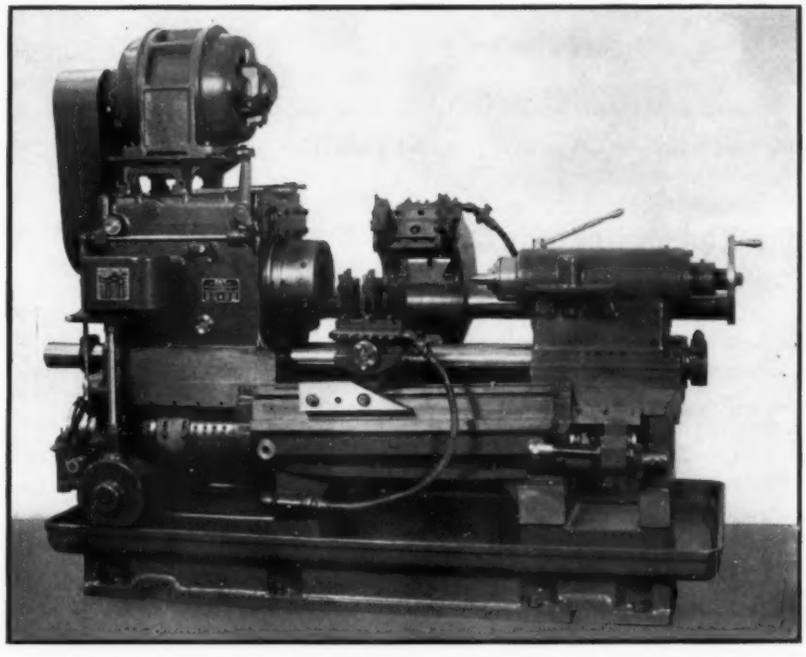
Cut Master Vertical Turret Lathes Specifications

	Machine Size				
All Dimensions in Inches	30	36	42	54	64
CAPACITY—Diameter work with:					
Side Head in work'g position	34	39	45	58	67
Side Head below table top	44	45	54	62	72
Height under cross rail	25	30	37	44	54
Height under turret face	36¼	41¼	48¼	55¼	65¼
TABLE SPEEDS—With main drive pulley running 934	6.167 to 225.2	4.934 to 180.1	4.111 to 150.1	3.289 to 120.1	2.741 to 100.1
FEEDS per revolution of the spindle—in geometric ratio	Same on all machines—16 changes, 0.0026 to 0.500				
VERTICAL TURRET HEAD					
Vertical Movement	26	26	30⅜	30⅜	30⅜
Horizontal Movement	31½	34	29	37	43
RAM HEAD					
Vertical Movement	No Ram	No Ram	30½	30½	30½
Horizontal Movement	No Ram	No Ram	27	35	41
SIDE HEAD					
Vertical Movement	25¼	30¼	37¼	44¼	64¼
Horizontal Movement	18	18	21	27	27
MOTOR DRIVE	30 Hp.	30 Hp.	40 Hp.	40 Hp.	40 Hp.
Floor Mounted or Side Bracket Mounted for V-belt drive	1750 rpm. for all sizes				

Automatic Lathe and New Thread Grinder Offered by Jones & Lamson

Designed to take full advantage of modern hard alloy cutting tools, the 16-in. "Fay" automatic lathe announced by Jones & Lamson Machine Co., Springfield, Vt., will transmit power in excess of 50 hp. This heavy-duty lathe is furnished in five standard lengths with a capacity between centers of 23, 35, 53, 71 and 89 in. respectively. It will swing 12½ in. over the carriage and 17½ in. over the center bar and back bar. The machine has eight spindle speeds with a standard range of change gears ranging from 28 to 180 r.p.m. Spindle is mounted in precision preloaded roller bearings at the front end.

eter. Automatic wheel dressing, automatic compensation for the amount dressed off the wheel, automatic in-feed for the grinding wheel on successive cuts, and automatic stopping of the machine when size is reached are among the important features of this machine. A relieving attachment is available for grinding relief on taps, hobs and similar work. Varying degrees of relief from a single cam are made possible by moving a shoe in an elongated slot. This is accessible at the front of the machine by removing a cover. A hob grinding attachment for annular grooves, as on circular chasers, also is available.

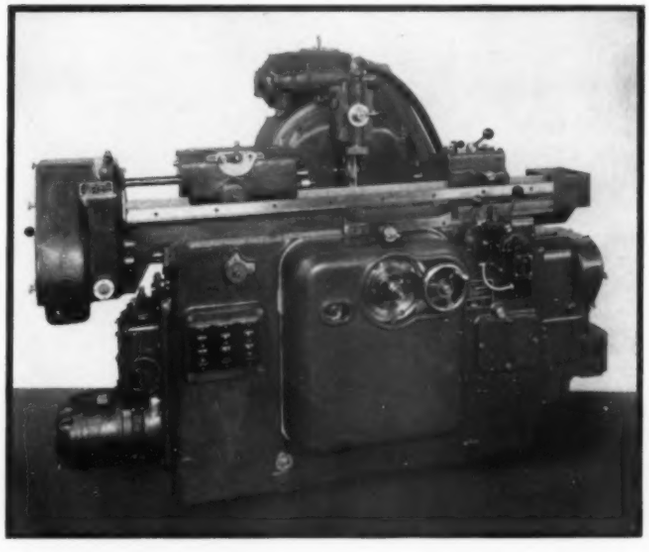


The 16-in. Fay automatic lathe will swing 12½ in. over the carriage and is available in five standard lengths

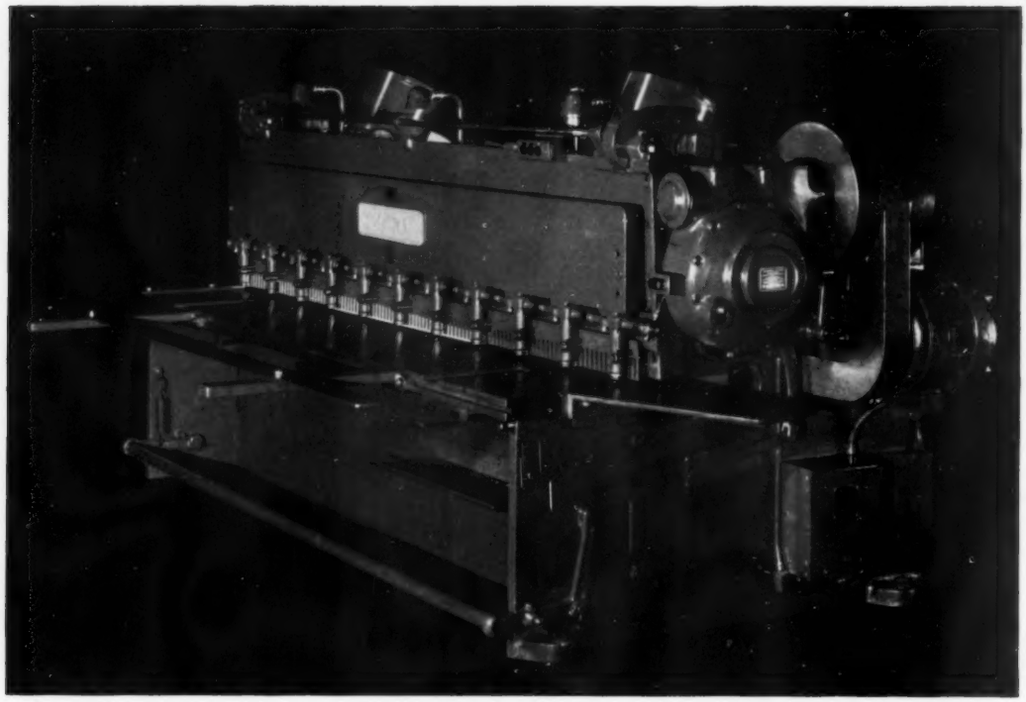
A new 6 x 36 in. automatic thread grinding machine also is offered by Jones & Lamson. This machine will grind threads up to 6½ in. maximum diameter, using a 20-in. diameter grinding wheel. It will swing work up to 7½ in. in diameter and will grind threads 12 in. long at one setting of the work. The machine accommodates work up to 36 in. long between centers. Three types of automatic wheel trueing devices are available.

The basic machine includes pitch change gears for grinding any pitch thread from 2 to 48 inclusive (33 different pitches) when equipped with an English lead screw, or from 0.5 to 12 mm. pitches when equipped with a metric lead screw. It will grind all of these pitches in either single, double, triple or quadruple lead, both right- and left-hand; the only limitation being the helix angle of the thread, which is 25 deg. max. for right-hand and 30 deg. for left-hand threads.

Rheostat control makes available an infinite variety of speeds for the grinding wheel, regardless of diam-



Single, double, triple and quadruple lead threads, both right- and left-hand, can be ground on the 6 x 36 in. J. & L. thread grinder

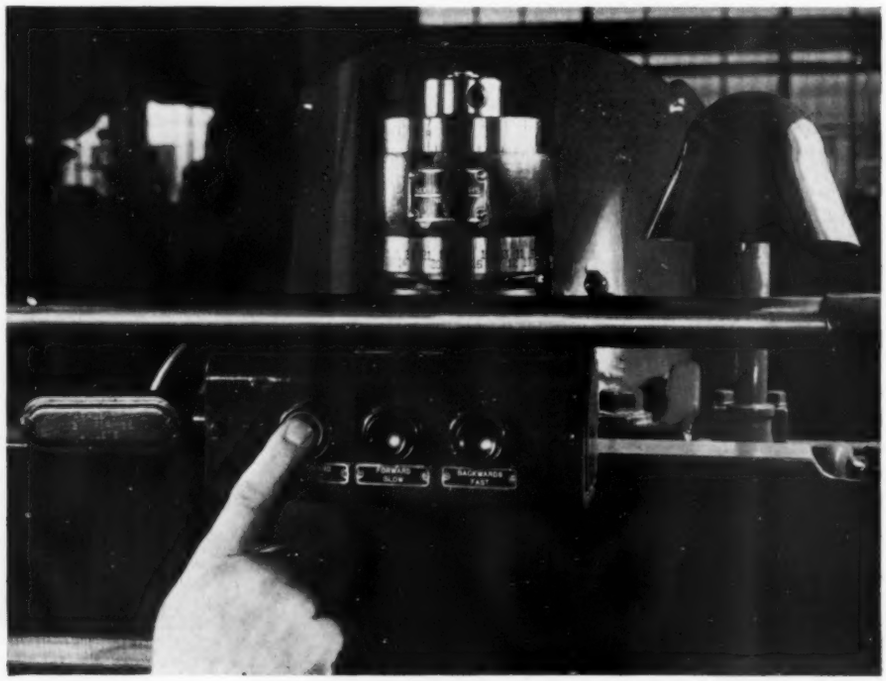


Cincinnati "All-Steel" shears now can be equipped with a front-controlled power back gage

Cincinnati All-Steel Shear Has Power Back Gage

Increased gaging speeds and accurate settings are the important advantages claimed for a front-controlled power back gage now provided as optional equipment on "All-Steel" shears offered by the Cincinnati Shaper Co., Cincinnati, Ohio. Finger-tip pushbutton control of this gage is from the front of the shear, conveniently located at the operator's position. Dials reading in inches and sixty-fourths or finer are mounted in front above the finger tip control. A fast forward and a fast backward speed give rapid movement to the desired position. A "spotting" button sets the gage accurately.

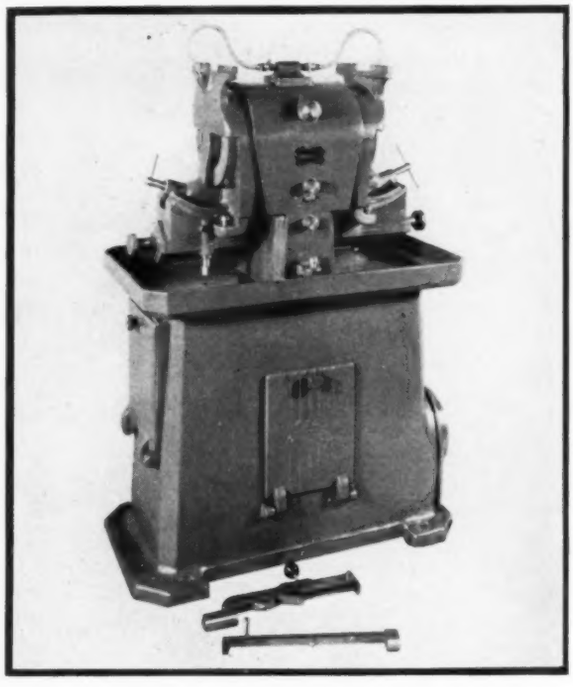
The Cincinnati "All-Steel" shears cut to close tolerances at high speed. For instance, the $\frac{1}{4}$x144-in. shear runs at 60 strokes a minute. Hydraulic holddowns automatically clamp any gage of metal with the same pressure. Fine adjustments are possible for the four-edge knives are claimed to give more efficient use of the keen edge and longer knife life.



Push-button control is provided for the power back gage. Dials indicating the setting of the gage are mounted above the control station

SHOW IN PRINT

Templets Control Oliver Tool Grinder



Templets are used to produce desired shapes on tool bits in this grinder

Desired shapes on tool bits up to ¾-in. square can be produced automatically in the tool bit grinder developed by Oliver Instrument Co., Adrian, Mich. The holder for the tool to be ground rests on a ball-and-socket joint at its lower end and has at is upper end a templet having the shape of the desired tool form enlarged to double size. This tool holder is placed on a ball which forms a part of the wheel guard and the templet is held so that it may contact a straight edge, also a part of the guard. The tool is rocked against the wheel until the templet comes in contact with the straight edge, then no more metal can be ground from the tool. The machine is equipped with a roughing and polishing wheel and when the roughing operation has been completed the holder is transferred.

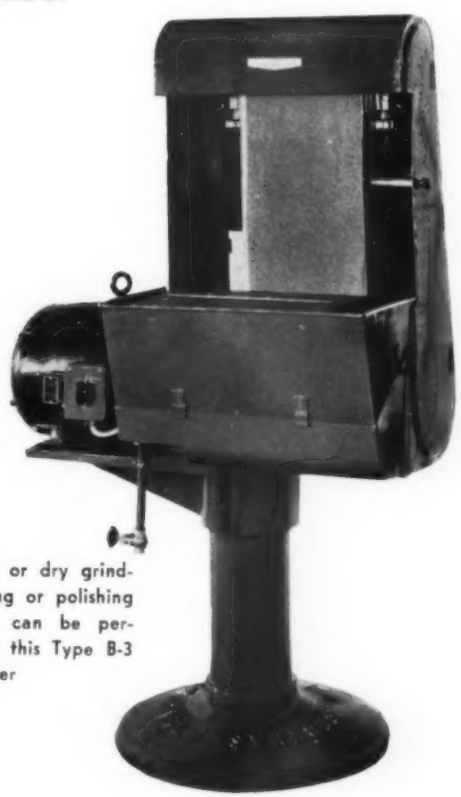
A special holder has been provided to permit economical production of templets. In this holder, a tool of the desired shape is rocked against a steel form and a blank templet is ground to the desired shape on the wheel. The templet then is placed in the regular tool holder for reproduction of the tool shape. Setting gages are provided to regulate the amount of metal to be removed from the tool. These stops have micrometer adjustments. Any desired degree of clearance may be obtained by tipping the wheel guard in relation to the wheel. Adjustment is indicated on a graduated scale. The relation of the wheel to the straight edge and ball socket is maintained by means of a dresser mount which fits on the wheel guard.

Table Tilts on Porter-Cable "Wet-r-Dry" Grinder

The Type B-3 "Wet-r-Dry" belt sanding, grinding and polishing machine manufactured by Porter-Cable Machine Co., Syracuse, N. Y., has a 9x16-in. table which can be tilted 15 deg. up or 45 deg. down for angle work. Height of table from floor is 37 in.

"Wet-r-Dry" cloth belts for this machine are designed especially for use with water and have high tensile strength. They are available in a number of grits. Belt width is 10 in. and belt speed is maintained at 3,400 ft. per min. Wet sanding and polishing is claimed to avoid frictional head and discoloring, and to avoid chipping of brittle materials such as glass. It is said that finer results are obtained with any grit, for instance, working with a No. 80 belt, the finish is comparable to a No. 120 belt used dry.

This machine may be operated in either a vertical or horizontal position for either wet or dry grinding, sanding or polishing. The unit is equipped with spray-jets below the table. These spray a water mist over the width of the belt. The belt is closed except at the operating point. Water is confined within the guard and drains from the bottom of the machine without flushing. The machine is equipped throughout with ball bearings and is driven with a 1½- or 2-hp. motor. Net weight is 400 lb.



Either wet or dry grinding, sanding or polishing operations can be performed on this Type B-3 belt grinder

"Cyclops" Needle-Type Roller Bearings Have One-Piece Outer Race

Self-contained "Cyclops" needle bearings are available to fit shafts from 0.500 to 8 in.

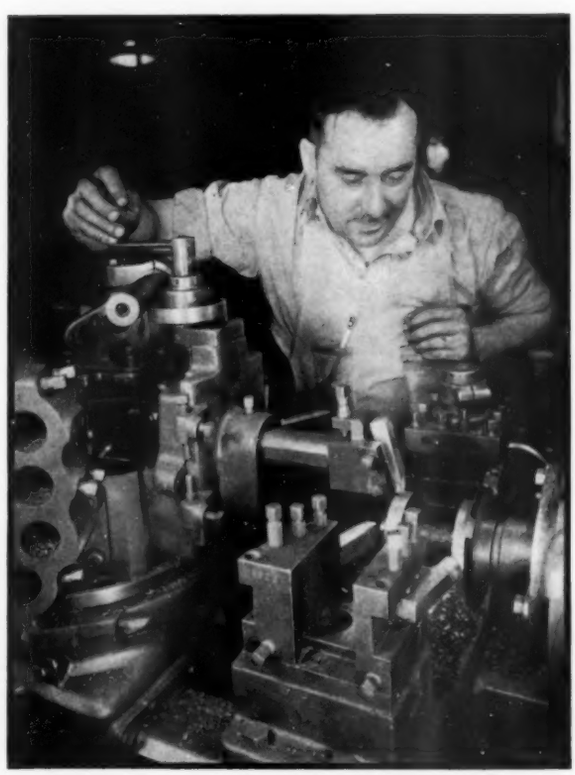
The component parts of the "Cyclops" needle-type roller bearing developed by Roller Bearing Co. of America, Trenton, N. J., are confined to the outer race, rolling elements, and the inner race. The one-piece outer race is designed so that the rolling elements can be assembled and retained as a self-contained unit without any auxiliary parts. Ends of the rolling elements are conispherical and make ball-point contact with the side walls of the race. Recesses are located at both ends of the outer race to increase the supply of lubricant within the bearing. An oil groove on the outer race eliminates the need for machining one in the housing bore.

Bearings having outside diameters of 4½ in. and less have a channel into which a snap-ring can be fitted to locate the bearing in the housing. All corners of the race have formed radii to facilitate mounting the bearing in the housing and on the shaft. Elements of these bearings are made only from S.A.E. 52100 steel and all sections are hardened through. Bearings are available with or without inner races to fit shafts ranging from 0.500 to 8 in. or more.

Rexalloy Tool Bits Remain Hard at High Temperatures

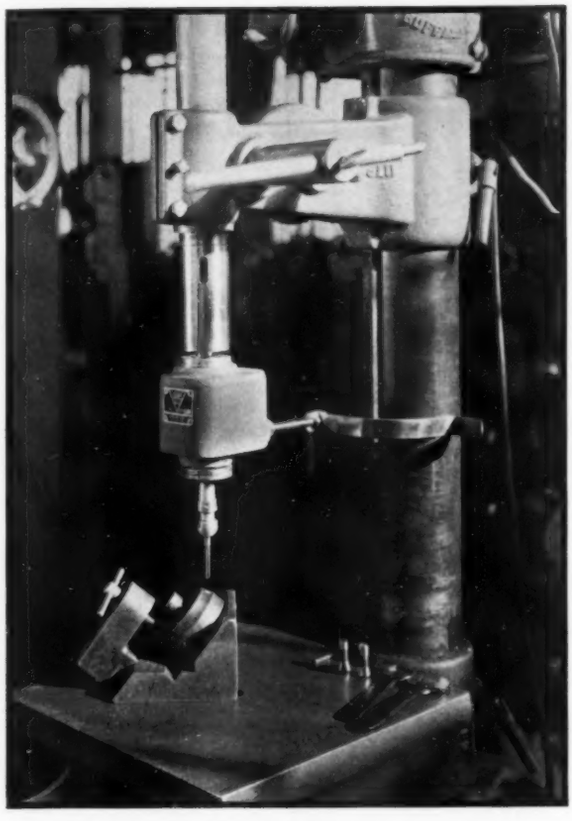
Rexalloy, a cast non-ferrous cutting alloy in which cobalt, chromium and tungsten are combined, is offered by Crucible Steel Co. of America, 405 Lexington Ave., New York, N. Y., in the form of tool bits for machining steel, malleable iron, cast iron and non-ferrous metals on modern high-speed production machines. Generally, it may be used on all types of machine tool equipment, provided the tool bit is properly supported, since it does not have the toughness of high-speed steels.

This material has such a high degree of hardness at elevated temperatures that it is practically unforgeable. Tool cutting angles customarily applicable for high-speed steel tool bits may be used. Minimum cutting and clearance angles should be employed, the front and side clearance angles should be maintained at 7 deg. In machining steel, the top and side right angles should be only great enough to break the chip adequately. Either wet or dry grinding may be employed, but excessive heating and excessive pressure must be avoided.



Rexalloy cast tool bits have high resistance to abrasive wear and remain hard at high temperatures

Tapping Attachment and Flexible Shaft Units Announced by Charles L. Jarvis Company



Improved Jarvis tapping attachments now have a neutralizing device

Improved high-speed all-ball-bearing tapping attachments developed by the Charles L. Jarvis Co., Middletown, Conn., are equipped with a neutralizing device which keeps the chuck in the neutral position when the tap is not actually engaged. Longitudinally adjustable, spring-locking side rods eliminate vibration. Single-purpose, positive grip collets are standard equipment. These attachments are equipped with forward and reverse friction and double reverse speed. They are available wtih capacities from No. 2–56 to $\frac{3}{4}$ in.

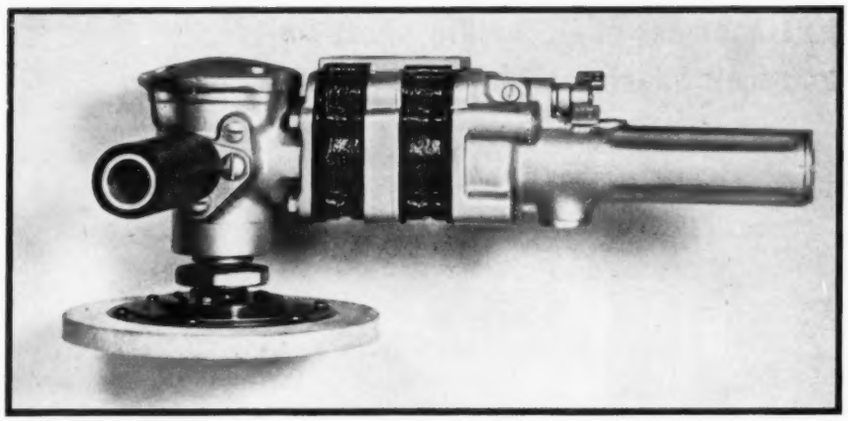
The "Multi-Biax" flexible shaft unit now is equipped with a sliding cast-aluminum one-piece guard protecting the four speed pulleys and belt. Capacitor starter-type motors are used for all single-phase units. Speed range of the shaft is 1,000, 2,000, 4,000 and 7,000 r.p.m.

The precision ball-bearing collet hand piece has been designed for increased strength. The rubber casing has been strengthened and reduced in outside diameter. These units can be used in connection with rotary files, sanding drums or grinding wheels for all types of finishing operations on metal patterns, castings and similar parts.

The hand piece of this flexible shaft unit has been redesigned and strengthened

Magnesium Alloy Reduces Weight in "Power-Plus" Portable Grinders

Magnesium alloy is used to reduce the weight of the No. M-818 and No. M-819 "Power-Plus" right-angle head grinders announced by the Rotor Tool Co., 17325 E. Euclid Ave., Cleveland, Ohio. These machines have vertical spindles and are designed with the smallest possible clearance for height and side to center distances so that the tools can be used in close places. They are suitable for grinding with cup wheels, for sanding with 7 or 9 in. pads, or for wire brushing with 4 or 6 in. cup brushes. Spiral bevel gears are employed and the ball and thrust bearings are mounted in steel inserts in the magnesium alloy housing. These

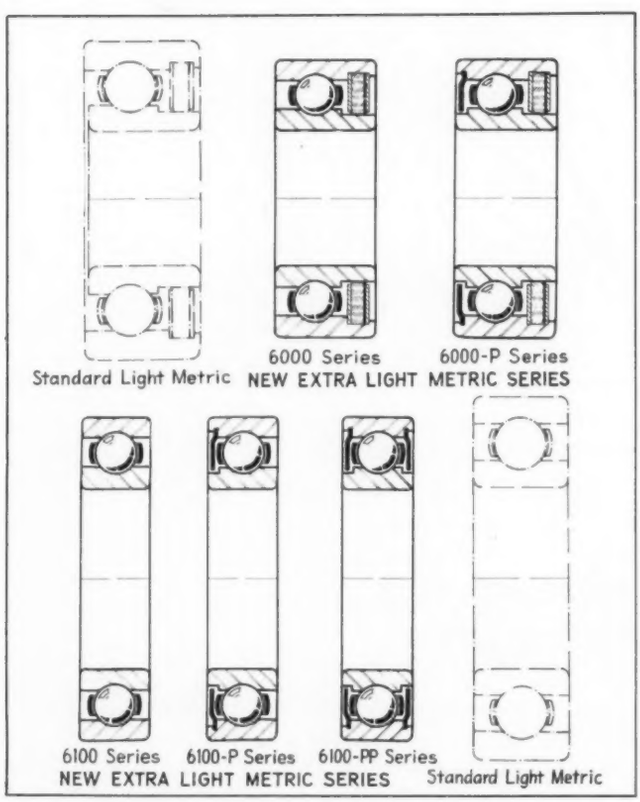


Designed with the smallest possible dimensions, the Rotor No. M-818 pneumatic grinder is well balanced

air-powered units can be furnished with water feed for wet operations.

The M-818 grinder runs free at 7,500 r.p.m. for 4-in. elastic cup grinding wheels and for 4-in. cup brushes, and at 6,000 r.p.m. for 5-in. elastic cup grinding wheels and 7-in. sanding pads. The M-819 grinder operates at 5,000 r.p.m. for 6-in. elastic cup wheels, for 9-in. pads or 4-in. brushes and at 3,500 r.p.m. for 6-in. cup brushes. Speeds of 3,100 and 2,480 r.p.m. also are provided for stone work. Weight of the M-818 grinder is 9 lb., while the larger unit weighs 11 lb.

Extra-Light Ball Bearings Developed by Norma-Hoffman



Five types of extra-light ball bearings now are available in two new series

Norma-Hoffman Bearings Corp., Stamford, Conn., has announced the development of two series of extra-light ball bearings designated as No. 6000 and No. 6100. These bearings meet the demands of manufacturers of small high-speed units in which minimum weight is sought, center distances are restricted and designers are cramped for space. The accompanying drawing shows the five types in these two series, together with a section of a standard light ball bearing for purposes of comparison. It will be noted that, for a housing of given diameter, the No. 6000 and No. 6100 series permit using a shaft of larger diameter. Similarly, for a shaft of given diameter, these bearings need a smaller housing.

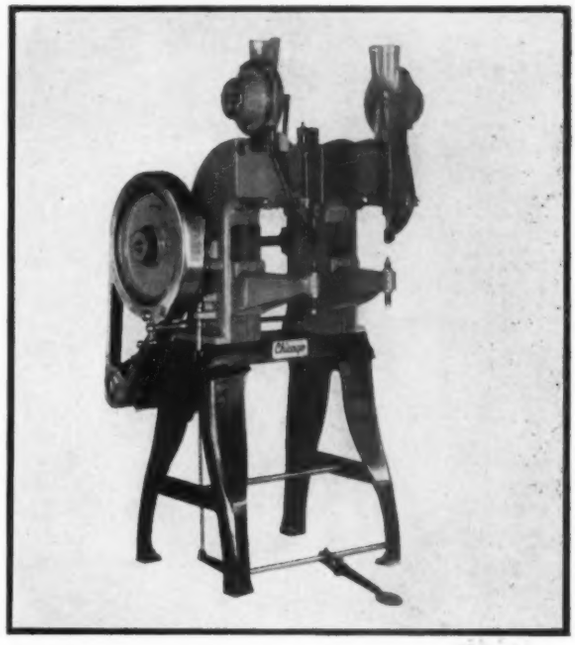
In the No. 6000 series, felt-sealed bearings, furnished with single belt seal as No. 6000, or with felt seal and side plate or shield as No. 6000-P, the sealing devices are wholly within the confines of the bearing. The felt seals are firmly held in the grooves of the outer ring, but are removable to permit examination, cleaning or relubrication of the bearing. The wide, solid inner and outer rings make housing inserts unnecessary. The No. 6000 and No. 6000-P series are obtainable in sizes up to 25 mm. bore.

The No. 6100 series, already available in sizes up to 45 mm. bore, is supplied with outside plate or shield, designated as No. 6100, with one side plate as No. 6100-P and with two side plates as No. 6100-PP.

SHOW IN PRINT

Chicago Automatic Riveter Sets 1/4-in. Rivets

The Model 82 automatic double-head rivet setter announced by Chicago Rivet & Machine Co., 1832 S. 54th St., Chicago, Ill., will sort, feed, insert and clinch up to ¼ in. diameter steel tubular rivets. The two heads are supported by a substantial bed along which the right-hand head is adjustable for varying center distance requirements. Provision is incorporated in these heads for raising and lowering the anvils, thus permitting the heads to be used on a wide range of assembly operations. Drive to the flywheel is by double V-belt from a motor mounted on the rear of the bed. Drive shaft extends across the machine, connecting the two heads. Operation is controlled by a treadle adjustably mounted on a bar extending across the front of the machine. The arm of this treadle can be rotated 180 deg. through a horizontal plane to suit the operator.



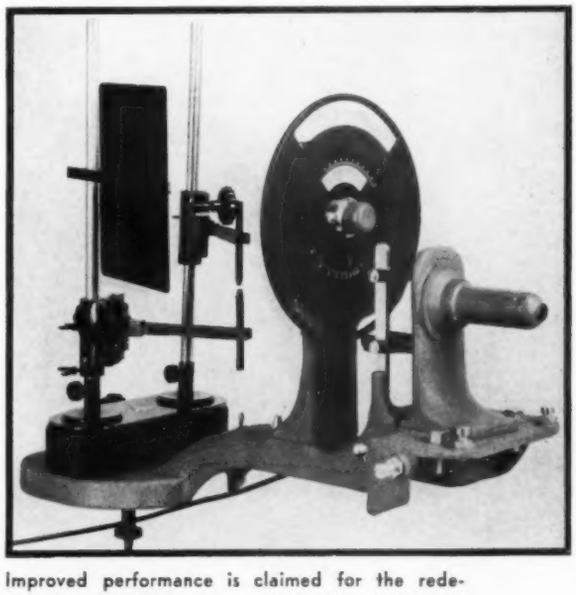
Center distance is adjustable to suit varying requirements on this Chicago riveter

Improved Sector Photometer Offered For Large Quartz Littrow Spectrograph

The sector photometer for the large "Littrow" spectograph manufactured by Bausch & Lomb Optical Co., Rochester, N. Y., has been redesigned to improve its performance. Instead of the two sector disks previously used, the new instruments have a single disk with two sets of sector openings properly spaced to intersect the two light beams. One pair is fixed, with openings transmitting light through two opposite quadrants, as in the former fixed-aperture sector. The other pair is adjustable and has percentage and density scales as in the adjustable sector of the previous model. This construction eliminates the slippage that formerly occurred between the two disks and insures exact synchronism in the interruptions of the two light beams.

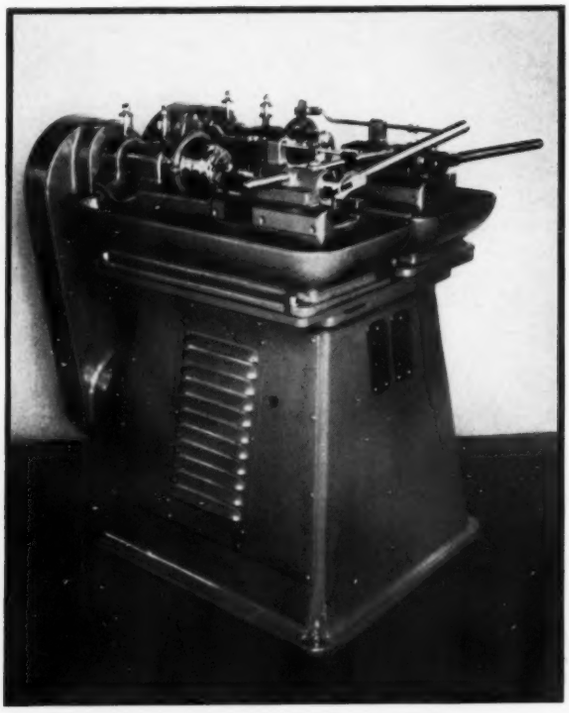
The improved sector disk is mounted so that the light passes through it before it strikes the sample. Thus the sample receives light only during the fraction of the time when the light is passing through the sector opening instead of continuously as in the older design with the sector beyond the samples. This minimizes changes in composition of samples.

The large "Littrow" spectograph, which has been successfully used in the analysis of various alloys, tool steels, bearing metals, die-casting alloys and the composition of electro-plating solutions, also has been improved by changing the form of the housing. Instruments now in production have a streamlined housing with rounded edges and corners, and with the top of the housing sloping down from the plate-holder casting to the prism ends. These changes improve the appearance of the instrument, but do not involve any change in the optical or mechanical design.



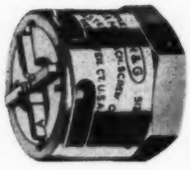
Improved performance is claimed for the redesigned sector photometer made by Bausch & Lomb

H&G Threading Machines Have Roller Bearing Spindles



Improved H&G two-spindle threaders have all auxiliary equipment concealed in the base

Developed for precision threading of small parts, the single-spindle threader shown has been designed by the Eastern Machine Screw Corp., 20 Barclay St., New Haven, Conn. It can be equipped with a lead screw having a sensitive take-off. The spindle of this machine is hardened and ground and is equipped with roller bearings and a ball thrust bearing. The ways are hardened and ground. Tail stock is of the collet type. All electrical equipment, as well as the oil pump and oil reservoir are concealed in the base of this machine, as is the Graham variable speed drive unit. A shelf is provided for holding gages and micrometers.



The No. 000 style SAMA solid adjustable die head weighs only three ounces

The improved two-spindle threader also has the driving motors, pump, cutting oil reservoir and all electrical equipment concealed in the base. Standard die heads are employed on both of these machines.

The No. 000 style SAMA solid adjustable diehead using insert chasers weighs only 3 oz. It is designed for use with acorn-type die holders, and has capacity for threading parts up to $\frac{1}{4}$ in. in diameter. It is particularly suitable for use on No. 00 B. & S. automatic screw machines and is $1\frac{1}{8}$ in. outside diameter. Overall length of this holder is 1 in.

Equipped with a variable speed drive, this H&G threading machine has a lead screw attachment

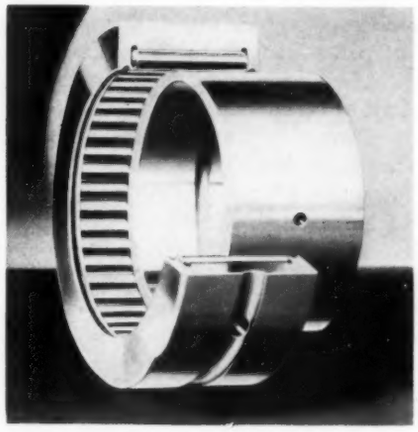
Hydraulic Pallet Trucks Made in Three Sizes

Hand-operated, these pallet trucks incorporate an hydraulic lift system

Built especially for handling double-faced pallets, these hydraulic pallet trucks, made by the Barret-Cravens Co., 3255 West 30th St., Chicago, Ill., are made in 2000, 3000 and 4000-lb. weight capacities. They are recommended particularly for use as auxiliary equipment for taking care of short hauls, load spotting and general placing of pallets when power-operated trucks are used for long hauls.

SHOW IN PRINT

McGill "Solidend" Bearing Has Increased Capacity



No retaining end rings are used in the "Solidend" needle roller bearing

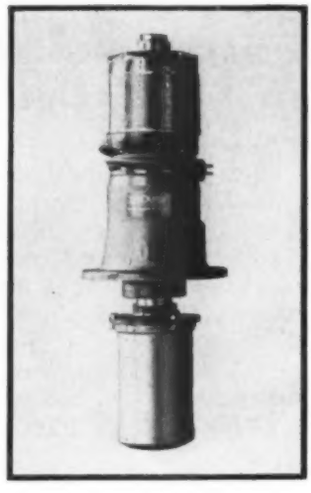
The "Solidend" Multirol needle roller bearing offered by the Bearing Div., McGill Mfg. Co., Valparaiso, Ind., is said to have increased load carrying capacity of as much as twelve per cent over any previous design. The name "Solidend" is descriptive of the improved outer race construction by which rollers are held integral without the aid of end washers or retaining end rings.

Roller retaining shoulders are built integral with the outer race so that the possibility of accidentally bending or breaking the conventional end washers is eliminated. Extra load carrying capacity is provided by using full length rounded-end rollers instead of the usual trunnion or conical ends. A variety of size combinations that can be used with or without the separable inner races in shaft sizes up to 5-in. diameter is available.

Motor-Driven Purolators Filter Grinding Coolants

The "Centri-Filter" motor-driven Purolators announced by Motor Improvements, Inc., 365 Frelinghuysen Ave., Newark, N. J., are designed principally for filtering grinding coolants consisting of soluble oil and water, kerosene or other light coolants or cutting oils. Listed as Types G-100, G-101, and G-109, these filters are made in three sizes, with capacities of 20, 40 and 75 gal. per min. respectively.

The filter is installed in the existing tank, or an additional one, and is complete within itself, having a motor, pump and filtering element all in one assembly. Clean coolant is supplied continuously to the work and wheel, minimizing scratches.

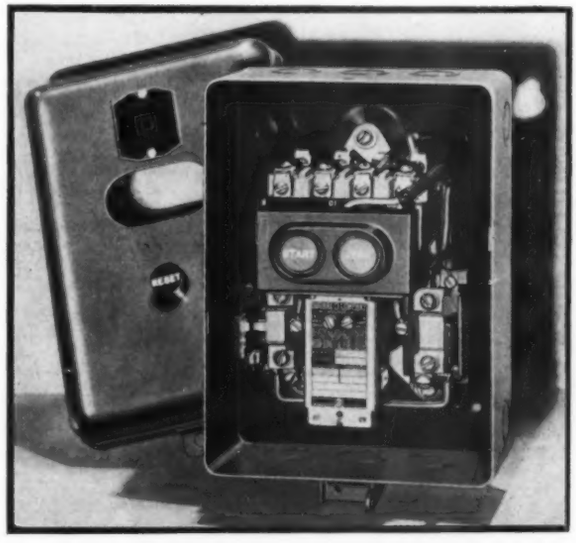


Slot widths can be as small as 0.0015 in these motor-driven Purolators

Square D Automatic Starter Operates Vertically

Developed for use with smaller sizes of polyphase and single phase motors, the Size O, Type R, Class 8536 automatic starter announced by the Square D Co., Milwaukee, Wis., has a maximum polyphase rating of 2 hp. at 220, 440, or 550 volts. Maximum single phase ratings are 1 hp. at 110 volts or 1½ hp. at 220 volts.

This starter has a vertically operating magnet, double-break silver contacts and thermal overload relays. It is offered with general purpose, dust-tight, water-tight or Class II, Group G inclosures. It also is available as a combination starter with either disconnect switch or circuit breaker, and in a reversing type.



The Size O, Type R automatic starter is accessible for inspection or maintenance

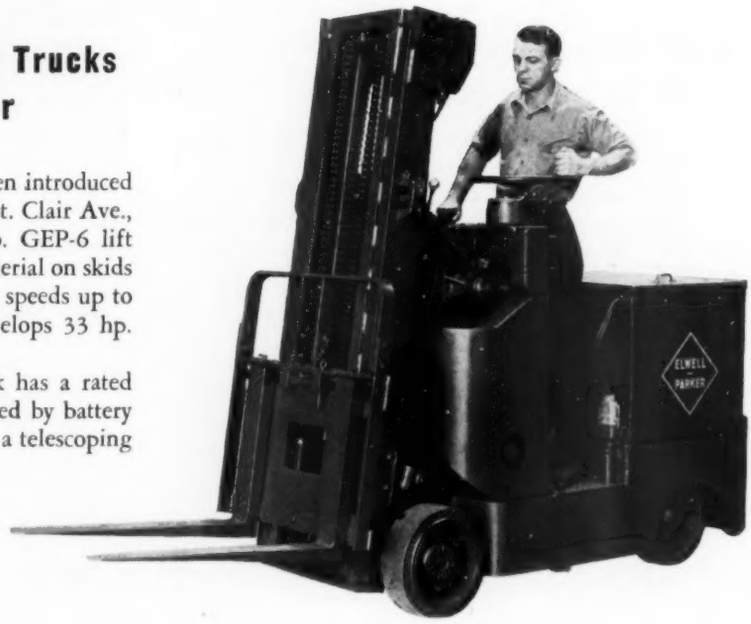
A four-cylinder gasoline motor drives this platform truck

Improved Power Industrial Trucks Developed by Elwell-Parker

Three power industrial trucks have been introduced by the Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland, Ohio. The stream-lined No. GEP-6 lift platform truck designed for handling material on skids has a rated capacity of 6,000 lb. and has speeds up to 10 m.p.h. The four cylinder motor develops 33 hp. at a normal speed of 1,250 r.p.m.

The No. F-15 center-drive fork truck has a rated capacity of 4,000 lb. and may be powered by battery or a gas-electric unit. It is built either as a telescoping or non-telescoping truck for inside car work or high tiering of pallet loads in the warehouse. The operator's station amidship affords him unobstructed vision of the fork tips when the load is being picked up or placed, and contributes to his safety without increasing the turning radius.

The streamlined No. C-4 crane truck which will be exhibited has a rated capacity of 3,000 lb. at 7 ft. outreach and has full magnetic contactor control. The hoist units are inclosed and mounted ahead of the battery compartment, allowing the operator unobstructed vision. Design of all three of these trucks is compact, yet all parts are readily accessible for maintenance.



The No. F-15 fork truck can be built either as a telescoping or non-telescoping unit

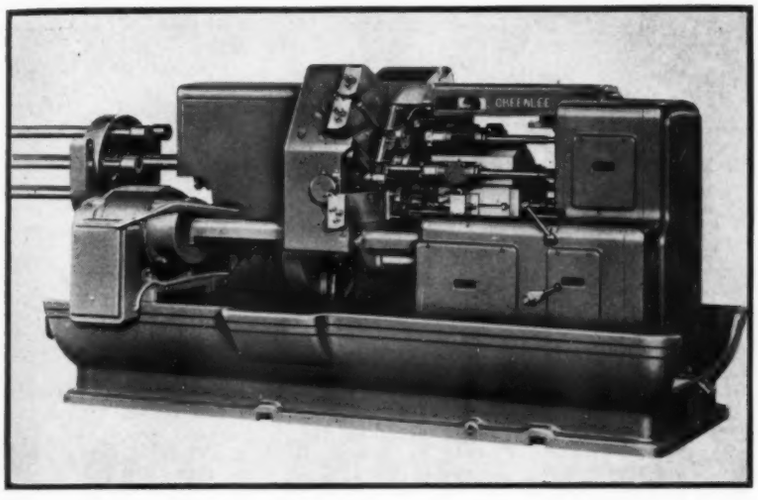
Cleaner and Soluble Oil Offered by Oakite

Among the diversified line of specialized compounds offered by Oakite Products Co., Inc., 22 Thames St., New York, N. Y., is a cleaner, composition No. 54, which has been designed for use with high-density reverse current in cleaning polished steel and buffed copper before plating. It is said to make practical the complete removal of carbonized smut in one operation, and to eliminate mechanical scrubbing or hand wiping.

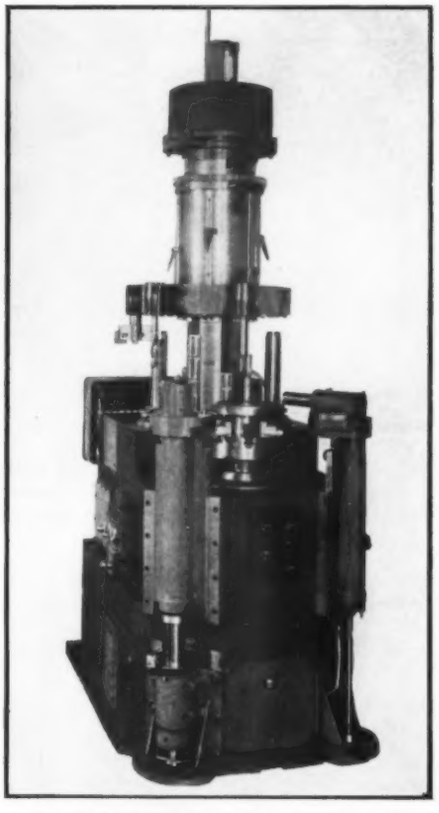
Also anonunced is a soluble oil adaptable to most types of turning and boring, cold sawing, threading and tapping, light drilling, milling and light broaching operations. This oil is made from paraffin crude and has a petroleum sulphonate as the emulsifying base. It is a chemically neutral material that disburses completely and readily into water to make stable emulsions within the range of from 3 to 60 parts of water to one part of soluble oil. Emulsions of this material are said to have high cooling ability and good rust preventative qualities. The material possesses considerable resistance to rancidity, thus resulting in greater life of the solution.

SHOW-IN-PRINT ROUND-UP

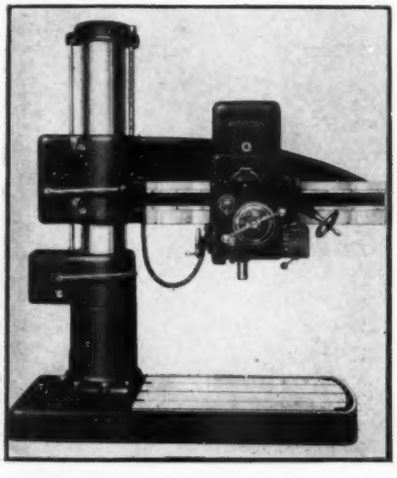
A PICTORIAL REVIEW OF THE MOST RECENT PRODUCTS OF SOME SHOW EXHIBITORS, NOT OTHERWISE REPRESENTED IN THIS NUMBER, APPEARS ON THE FOLLOWING PAGES. IT WILL HELP TO GIVE THE READER A MORE COMPLETE IDEA OF WHAT HE WOULD HAVE SEEN AT CLEVELAND



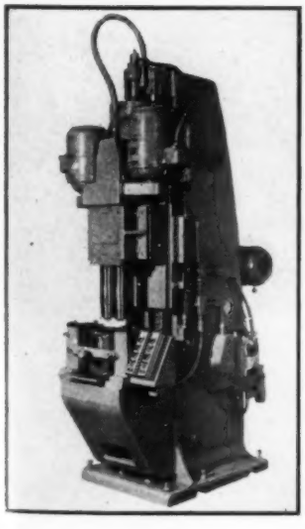
A new six-spindle automatic screw machine, by Greenlee Bros. & Co., has interchangeable cross slide camming, six independent cross slides, an automatic cycling stop and easily accessible tooling. Tapping or threading may be done in four positions



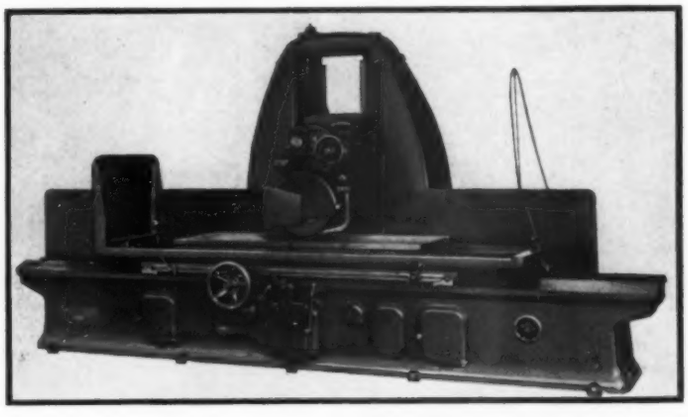
The Springfield Machine Tool Co., Springfield, Ohio, offers a new No. 377 vertical hydraulic turret lathe. The turret is supported by and operates on a rigid central column. Cutting-off and facing tools are set in slidably mounted columns at the front corners, and controls are conveniently located directly in front of the chuck



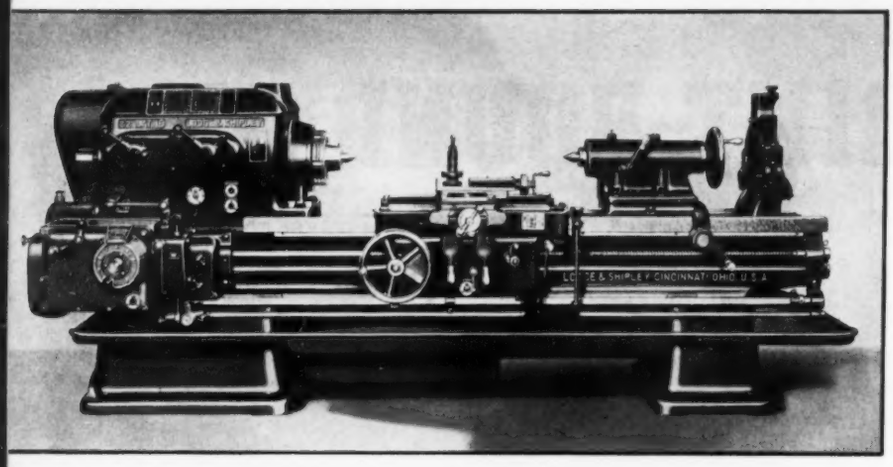
This 11-in. diameter column "Hole Wizard" radial drill is designed by the American Tool Works, Cincinnati, Ohio, with arm lengths of 3 to 6 ft. These machines are recommended for accurate boring



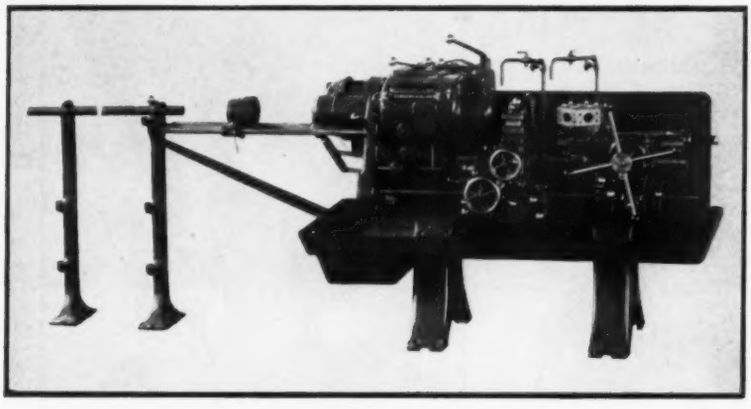
Arranged for finish boring cylinders with single-point cemented carbide tools, this No. 113 two-spindle fine boring machine made by Moline Tool Co., is fitted with automatic retracting boring heads. Spindles have individual motor drive



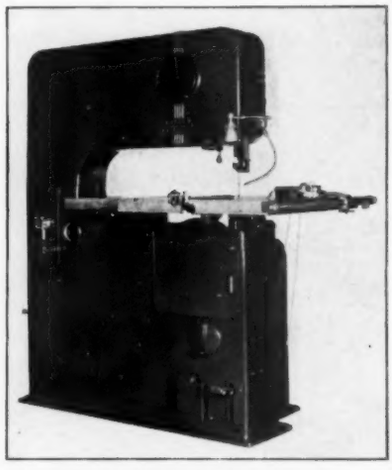
High-powered precision surface grinders with hydraulic feeds are furnished by the Mattison Machine Works, Rockford, Ill., with table widths of 12, 14, 16, 18, 20, 24 and 30 in. and lengths up to 16 ft. They feature double-column support for the wheel slide assembly, totally enclosed wheel spindle, and non-differential twin-cylinder hydraulic table drive



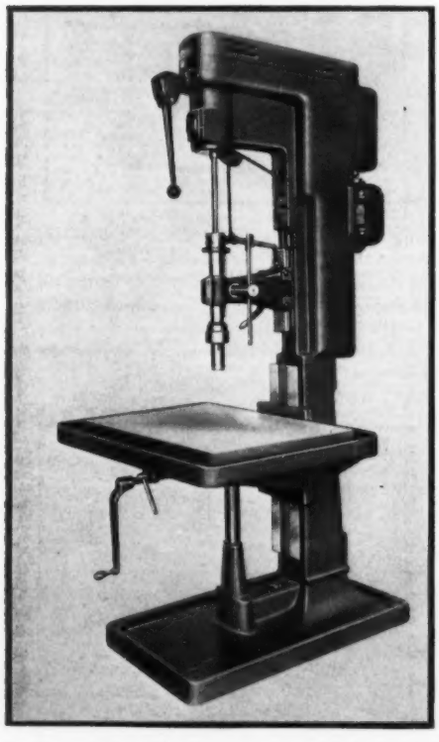
This 22-in. selective-head toolroom lathe, built by The Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, incorporates fully enclosed oil-tight quick-change gearing, an anti-friction apron, an improved bedway design, and a wide range of spindle speeds, threads and feeds. Lathes of 18- and 20-in. swing also includes these features



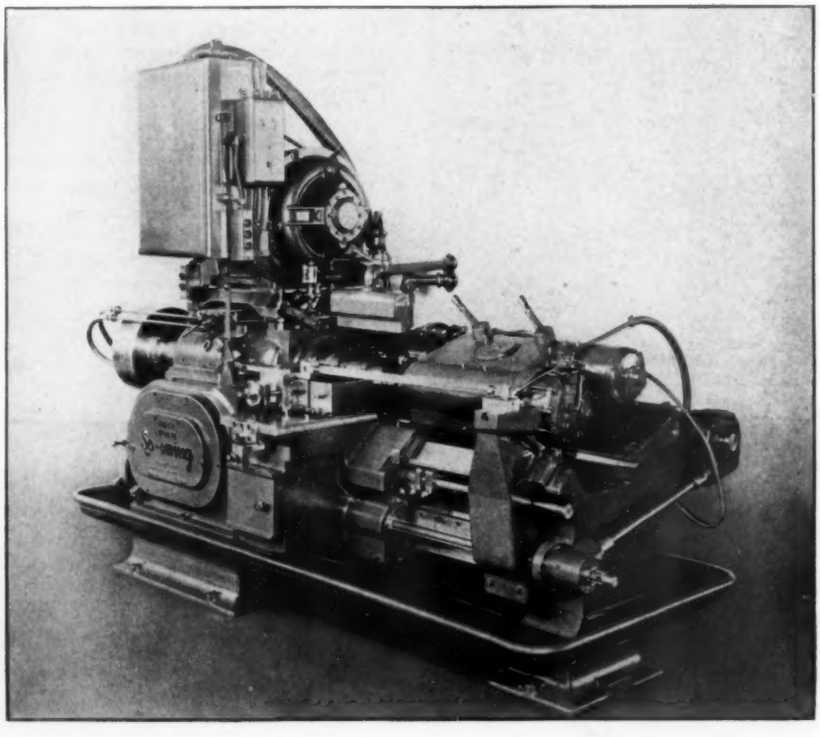
Bardons & Oliver, Inc., Cleveland, Ohio, has improved its No. 3 universal turret lathe with 1½ in. bar capacity and 15⅜ in. swing. Twelve-speed all-geared head has maximum spindle speed of 1525 r.p.m. when using an 1800 r.p.m. motor



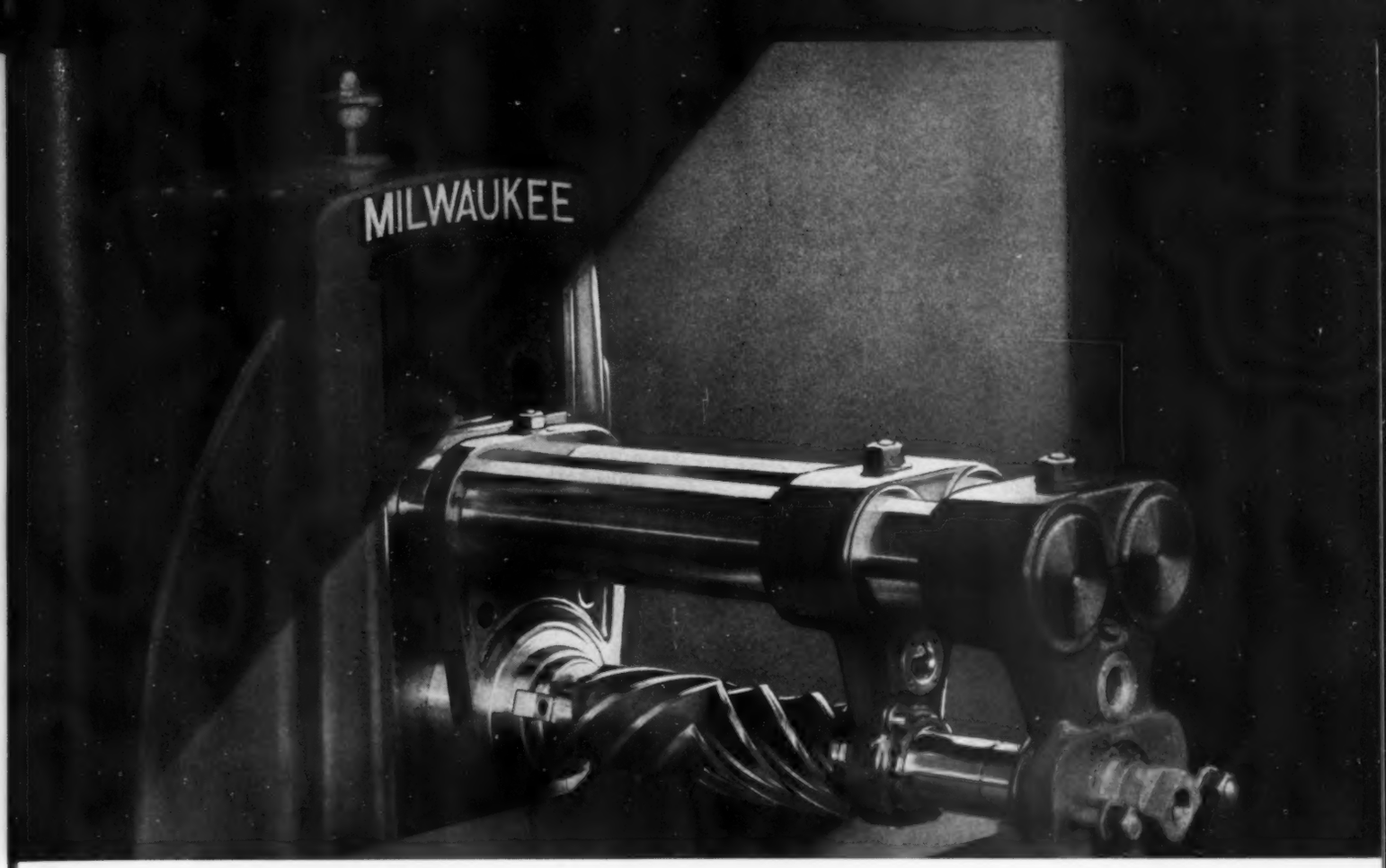
The Model V-36 "Doall" band sawing and filing machine, developed by Continental Machines, Inc., Minneapolis, Minn., has a 36-in. throat, a 10-in. working height, and a tilting table



This improved belted-motor sensitive drill press brought out by The Avey Drilling Machine Co., Cincinnati, Ohio, has a wide range of spindle speeds. A large table is recommended for tool and die work



The Model R-14 "Lo-Swing" Lathe made by the Seneca Falls Machine Co., Seneca Falls, N. Y., is automatic and has an all-mechanical quick change-over mechanism. Stroke can be changed by setting a graduated dial



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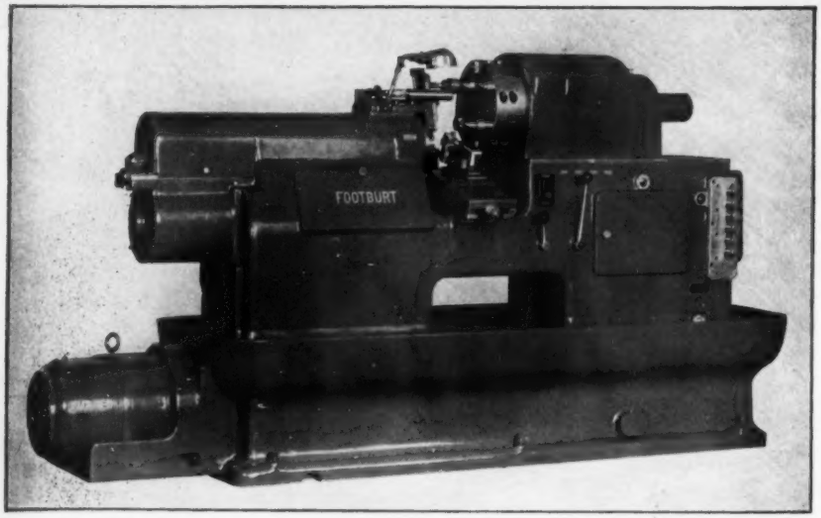
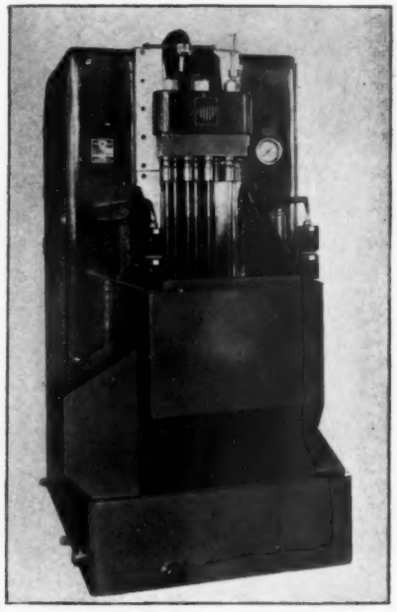
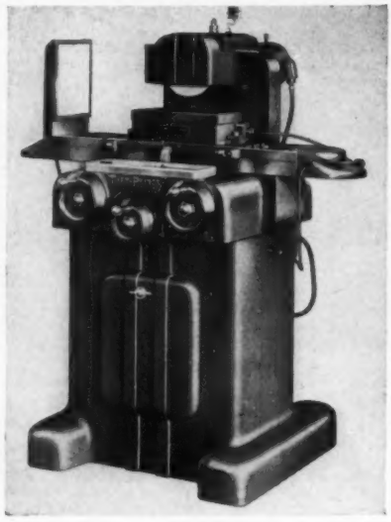


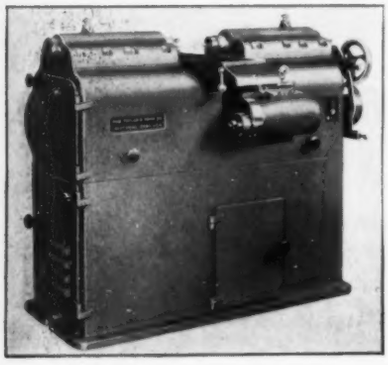
Hydraulic drive and control on this No. 1½ automatic screw machine by Foote-Burt Co., Cleveland, Ohio, effects ease in making set-ups. A chucking device with a roller arrangement working under spring compression eliminates the usual fingers. With a solid chuck, it will take 1⅝-in. stock and is effective down to ½-in. because of the wide range of spindle speeds available



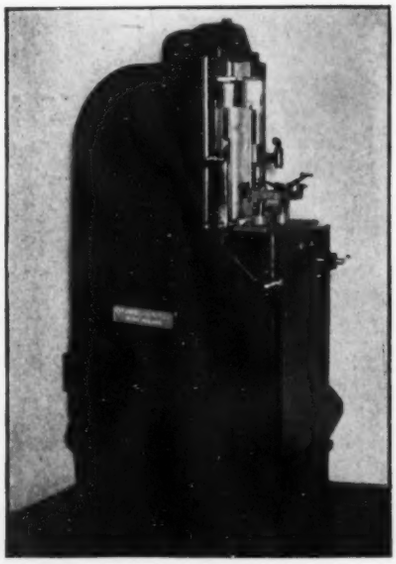
Type VP vertical pull-up internal hydraulic broaching machines made by American Broach & Machine Co., Ann Arbor, Mich., can be arranged for semi-automatic or automatic operation. Weight of slide has balancing effect on cutting tools, resulting in smooth, steady action

A precision surface grinder which employs ball tracks of hardened steel for the table is built by Taft-Peirce Mfg. Co., Woonsocket, R. I. Working surface of table measures 5 x 12 in., maximum height under wheel is 12 in. Set-up and adjustment is claimed to be simple

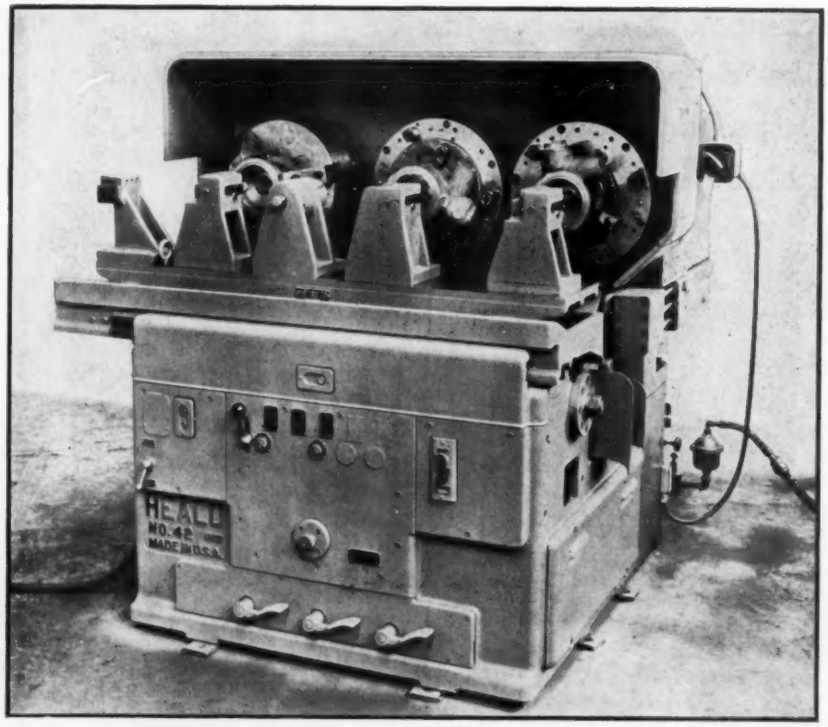




The No. M-80 duplex spline milling machine offered by the Taylor & Fenn Co., Hartford, Conn., is semi-automatic in operation and provides high spindle speeds



Colonial Broach Co., Detroit, Mich., designed this pull-down broaching machine for finishing keyways in the taper holes of steering-wheel hubs. It features simplicity of loading and unloading, while eliminating broach handling for internal broaching



The No. 42 "Bore-Matic" heavy duty precision boring machine originated by Heald Machine Co., Inc., Worcester, Mass., has two tables mounted at right angles. The front table is used for mounting tool blocks or stationary work fixtures. Heads on the rear table can be used for either work fixtures or tools. Hydraulic cylinders actuate both tables

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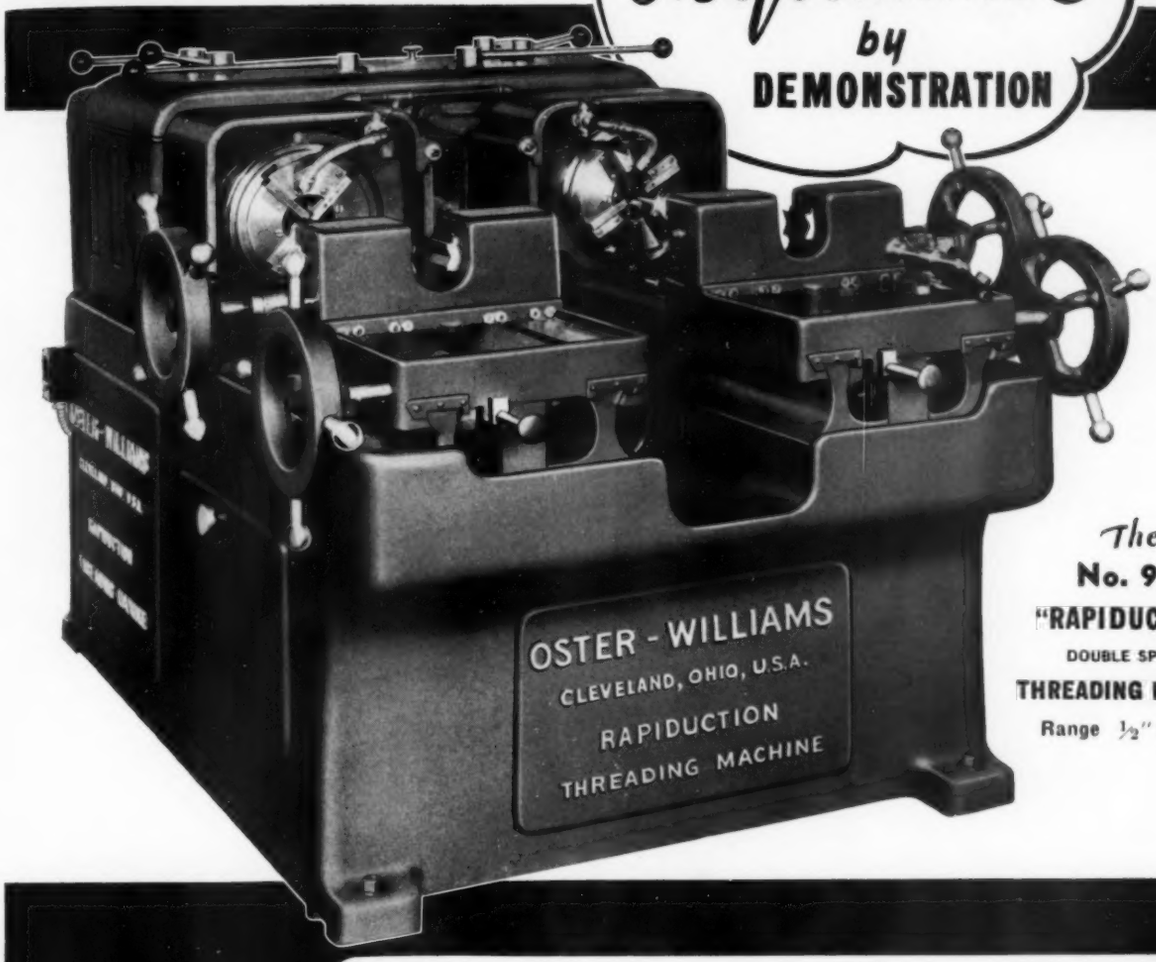

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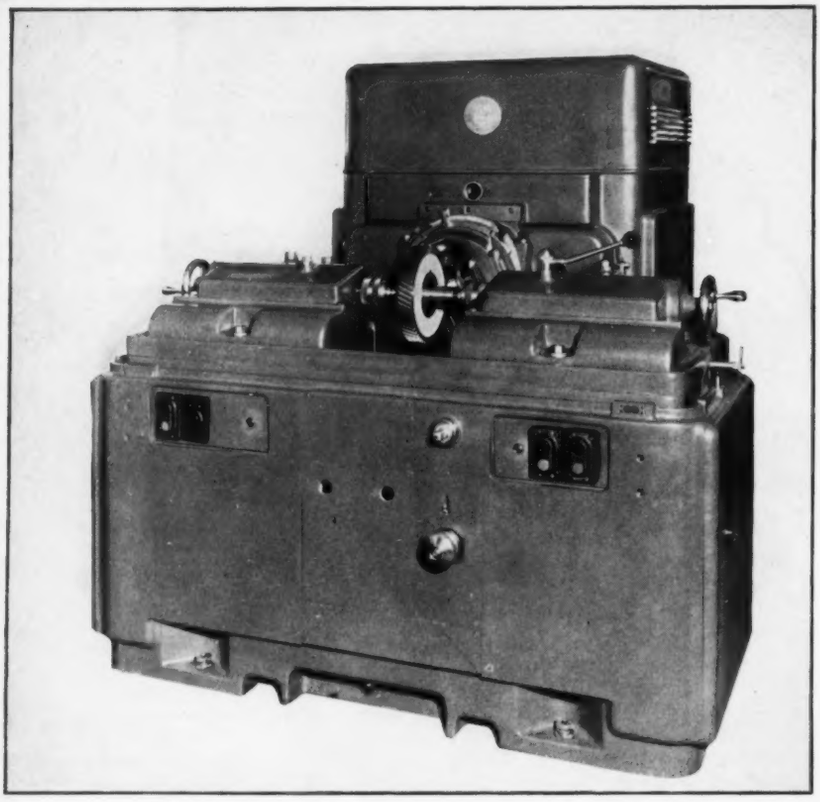
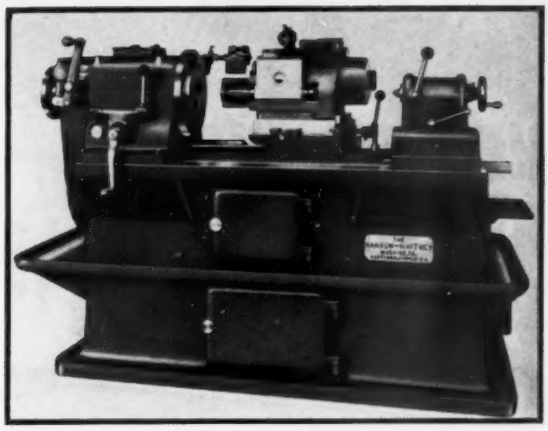
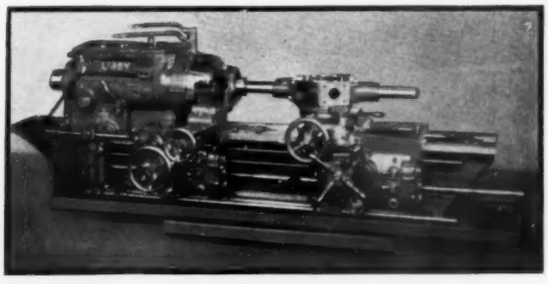


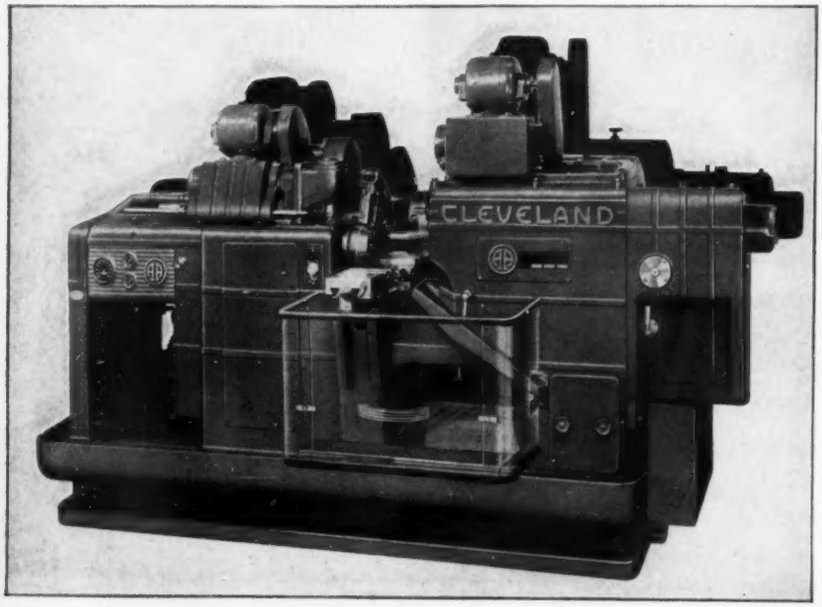
By employing a rotary tool, both spur and helical external gears can be finished rapidly on this No. 18 gear finishing machine built by the Fellows Gear Shaper Co., Springfield, Vt. Both the "cross-axes" and "parallel-axes" methods of finishing gear teeth can be employed, since the adjustable head can be set to any desired angle



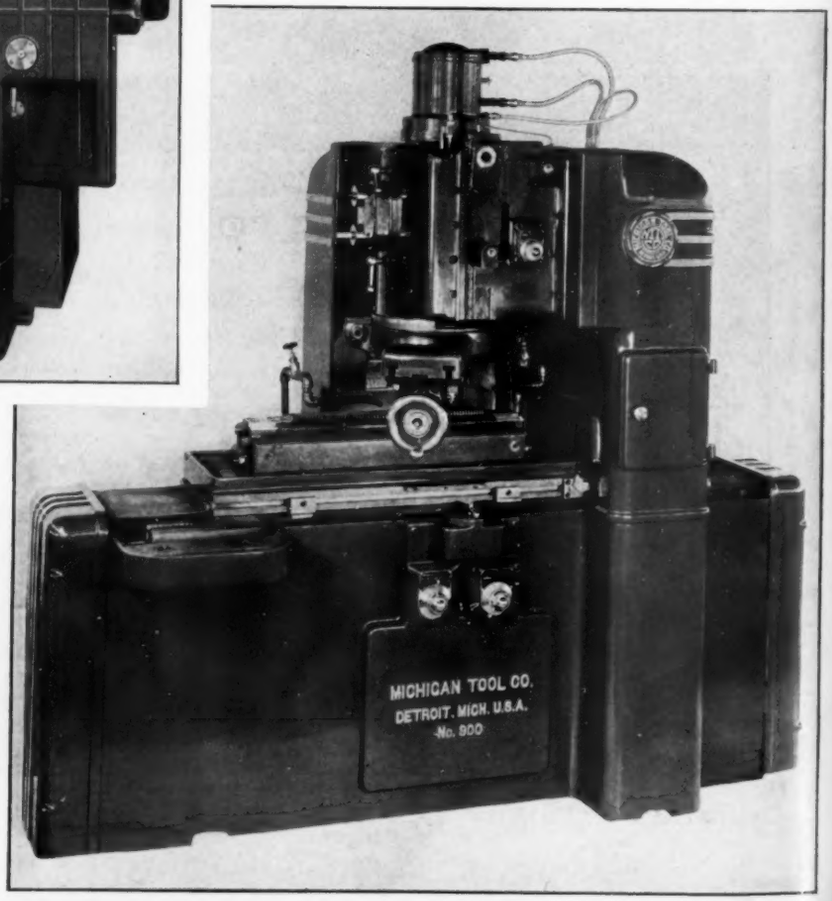
This 10x24-in. semi-automatic thread milling machine, manufactured by The Hanson-Whitney Machine Co., Hartford, Conn., mills external or internal threads, right or left hand, and either straight or tapered. The multiple-cutter principle is used in which threads irrespective of length are finished in one revolution of the work



Designed by the International Machine Tool Co., Indianapolis, Ind., for a wide variety of work, this heavy-duty turret lathe has a 24-in. swing, a 5¼-in. hole through the spindle, and a power cross-feed sliding turret. The latter has a built-in taper attachment



This Model 2 AA automatic screw machine, with a 1 1/6-in. bar-stock capacity and operating speeds up to 3,275 r.p.m., was developed by the Cleveland Automatic Machine Co., Cleveland, Ohio. While it will perform first-operations by means of the usual six-tool turret and cross-slides, a number of quickly changed motor-driven attachments are provided for second-operations on work chucked in a second spindle



The Model 900 gear finisher, by Michigan Tool Co., Detroit, Mich., is hydraulically operated and uses the cross-axis shaving method of cutting. Gears up to 8-in. in diameter can be finished

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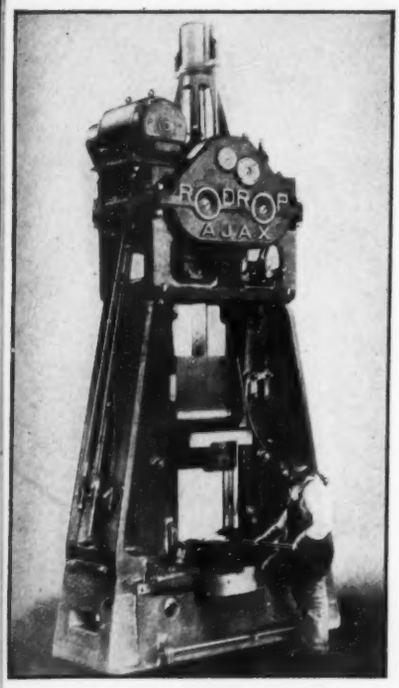
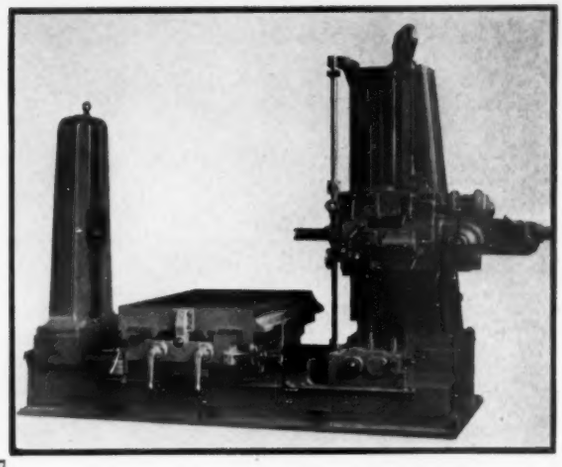
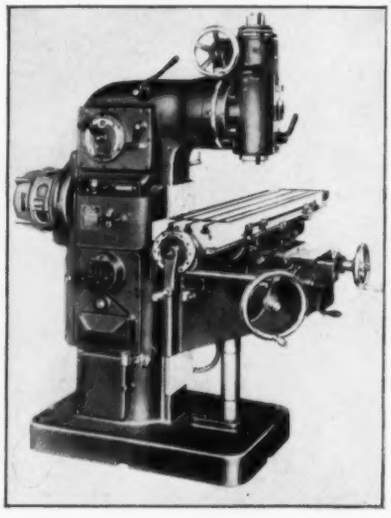


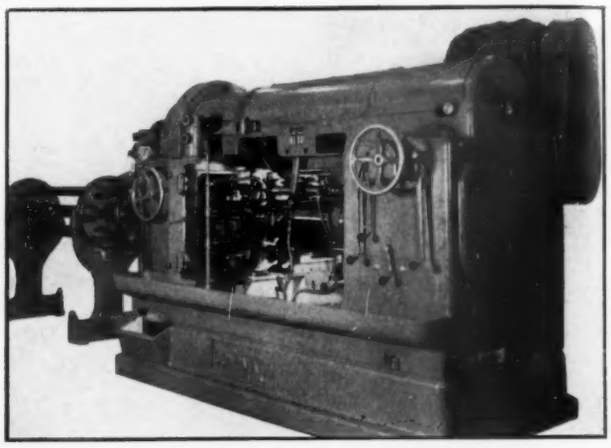
The "Rodrop" forging hammer developed by the Ajax Mfg. Co., Cleveland, Ohio, has a heavy square steel lift rod. This hammer approaches steam hammer operation as the stroke of the ram may be varied at will

Built by The Cincinnati Gilbert Machine Tool Co., Cincinnati, Ohio, this high-speed horizontal boring mill has a 3½-in. spindle with a 30-in. feed; 24 spindle speeds ranging from 24 to 1,420 r.p.m.; a table of 38 x 60-in. working surface; and a bed measuring 84 in. between the face plate and the bar support bearing

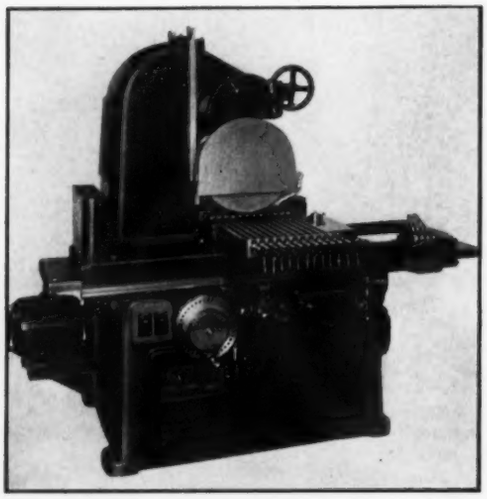




The swiveling head on this No. 2 vertical miller, by Brown & Sharpe Mfg. Co., Providence, R. I., permits setting the spindle in a vertical plane at either side of vertical up to 90 deg. Spindle has axial movement of 3 in.

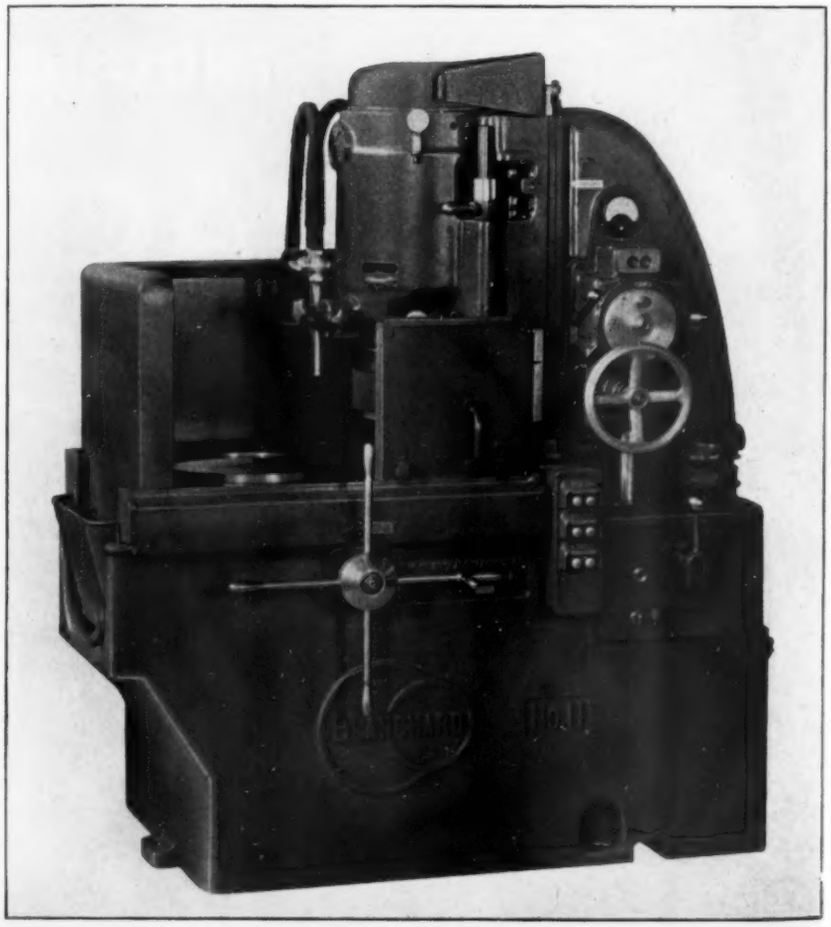


Six-spindle 3½-in. Conomatics, sold by the Cone Automatic Machine Co., Inc., Windsor, Vt., feature open-end gearing, high- and low-speed cam action which may be disconnected by the operator when checking tools, instantaneous power feed engagement, power feed reverse, and a wide range of feeds



Model BB hydraulic surface grinder, marketed by The Thompson Grinder Co., Springfield, Ohio, is shown equipped with automatic plunge-cut feed, hydraulic wheel-truing (contour), and an automatic table positioning valve. Gun-tube cam contours are ground within limits of 0.001 in.

The No. 11 surface grinder, created by the Blanchard Machine Co., Cambridge, Mass., has an 11-in. wheel and a capacity for grinding work up to 20 in. diameter and 8 in. high. It supersedes the No. 10 grinder, surpassing the latter in power and capacity, and operating at a lower wheel speed to obtain faster and cooler grinding with less wheel wear



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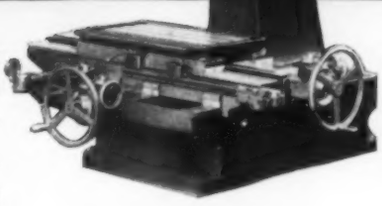

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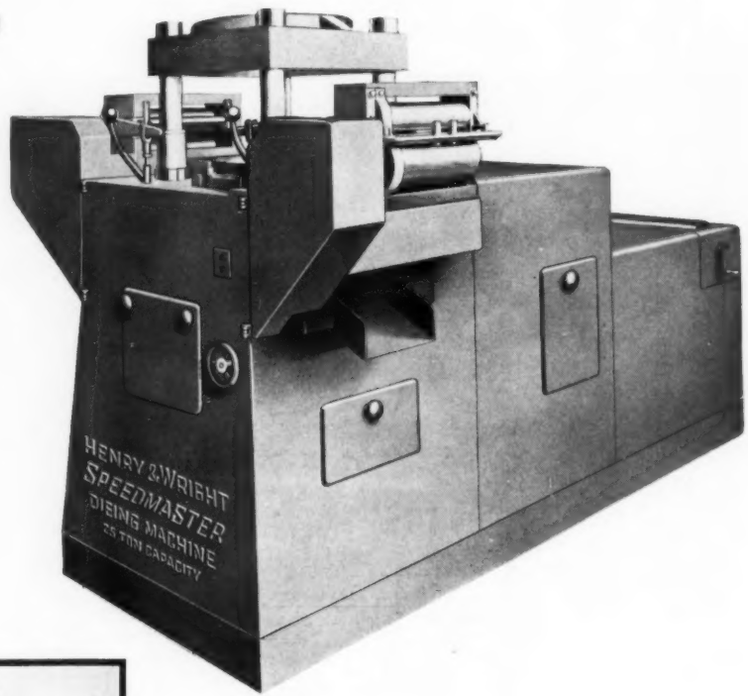
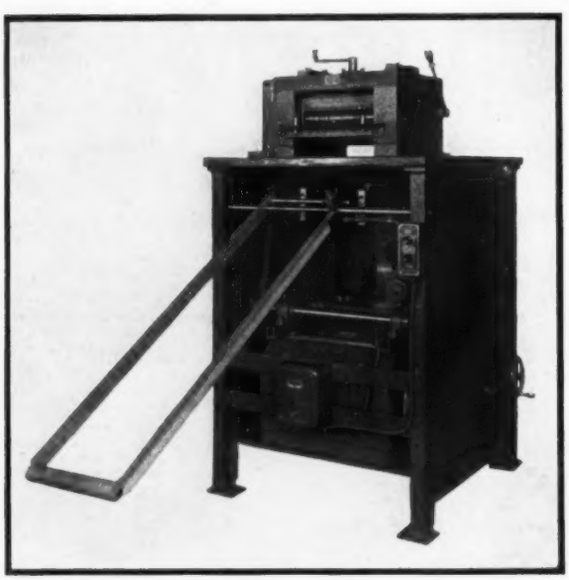
THE FOLLOWING NEW EQUIPMENT WAS TO HAVE BEEN SHOWN AT THE POSTPONED EXHIBITION, CENTRAL ARMORY, CLEVELAND, OHIO, OCTOBER 4-13, 1939

Henry & Wright Dieing Machine Can Operate at 600 Strokes a Minute



Drawing, forming and extruding operations, as well as the regular blanking and piercing operations, can be performed on this 25-ton dieing machine at high speeds.

Straightening rolls in this unit are individually adjustable for height



Capable of operation with progressive dies at high speeds, the 25-ton dieing machine announced by the Henry & Wright Mfg. Co., 760 Windsor St., Hartford, Conn., incorporates the basic principle used in the design of the standard 50-ton dieing machine with added features for high-speed operation. These features include counterbalancing, a precision feed drive, variable speed machine drives, improved bearings and lubrication, and special control provision. This machine is capable of operating at 600 strokes a minute with progressive dies. It is not limited to blanking and piercing operations, but is capable of performing drawing, forming and extruding operations as well. Cam actuated roll release is included in the feed mechanism, making it possible to arrange for piloting.

Automatically controlled, the power-driven seven-roll straightener incorporates independently adjustable rolls. Quick simultaneous adjustment of the rolls for height also is provided. In addition to the seven hardened and ground straightening rolls, a set of feed rolls are incorporated in this unit. The straightener is driven through a variable speed transmission, permitting timing of the rate of delivery with the feeding rate of the dieing machine or press with which it is used. Further control is provided by means of a balanced arm which rests upon material between the straightener and the press. This arm actuates a switch in the motor circuit and causes the motor to start or stop as the loop of material raises and lowers, thus insuring free material at all times.

This 9-in. swing back-geared bench lathe has 1-in. collet capacity

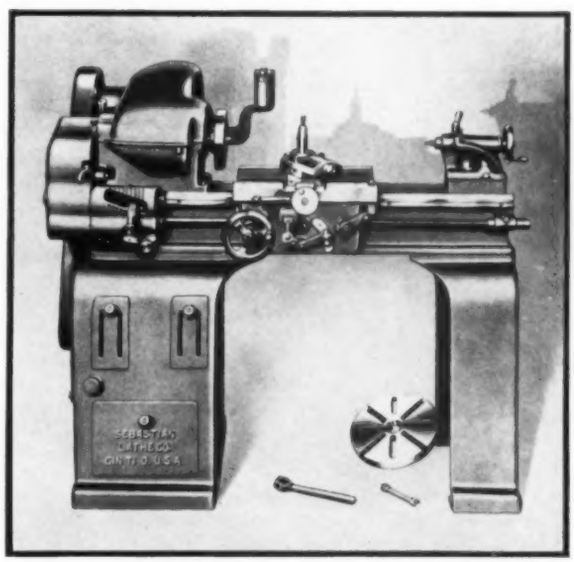
South Bend 9-in. Swing Bench Lathe Arranged for Screw Cutting

The improved 1-in. collet capacity, 9-in. swing bench lathe, offered by South Bend Lathe Works, 426 E. Madison St., South Bend, Ind., will cut screw threads ranging from 4 to 224 per inch. Power cross feed and power longitudinal feed are provided through friction clutches in the double wall apron. There is a $1\frac{3}{8}$-in. diameter hole through the spindle.

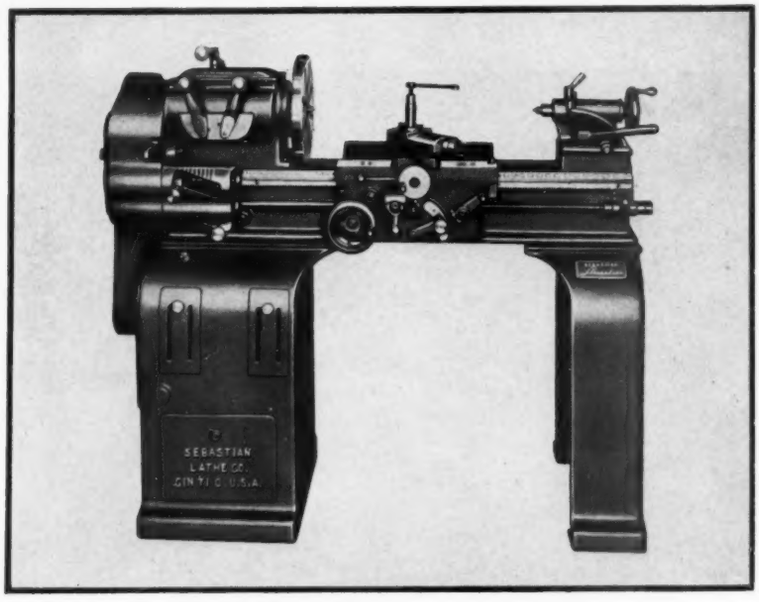
Attachments available for production work with this lathe include hand lever draw-in collet check, semi-automatic hand lever bed turret, double toolrest, automatic carriage stop, four-way tool post turret, and oil pump and piping. Toolroom attachments include hand wheel draw-in collet check, telescopic taper attachment, micrometer carriage stop, thread dial indicator and collet rack. The all-steel welded bench on which this lathe is mounted incloses the motor drive in the left side of the bench, while the right side has three large drawers for storing chucks, tools and accessories. Twelve spindle speeds are provided by the motor drive unit.

Sebastian Lathes Have Improved Aprons

Improvements in the Type L cone head and Type S geared head lathes have been announced by the Sebastian Lathe Co., Cincinnati, Ohio. The "Stremeline" Type L cone head lathes, are available in 10-, 12- and 13-in. swing capacities, all with underneath motor drive. These lathes incorporate an improved apron which has an oil reservoir for constant lubrication of gears and bearings. Hole in the spindle of all of these lathes is $1\frac{3}{8}$-in. diameter and collet capacity is 1-in. diameter. Friction feed in apron is controlled by drop lever. These cone head lathes incorporate flat-belt drive from the motor to the jackshaft and flat-belt drive from the 3-step cone pulley on the jackshaft to the cone on the spindle. A backgear is provided. Lifting the guard above the cone pulleys releases belt



This 12-in. Type L Sebastian cone head lathe includes a belt guard interlocked with the electrical control circuit

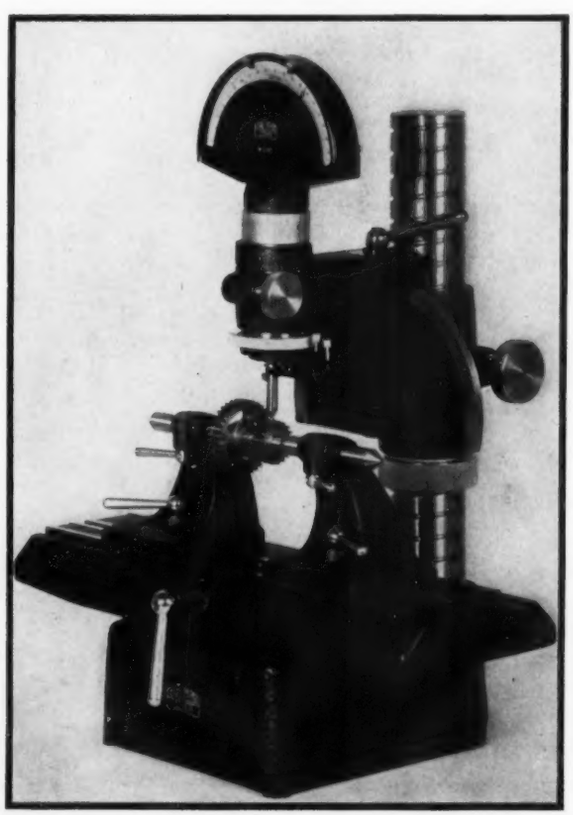


Apron on the Type S geared head Sebastian lathe now incorporates an oil reservoir for lubrication of all gears and bearings

tension and breaks the electrical circuit so that the lathes cannot be operated until guard is in position.

Type S "Stremeline" Sebastian lathes have been improved by changing the design of the head, providing an oil reservoir in the apron, and a 1⅜-in. diameter hole in the spindle for the 12-, 16 and 20-in. sizes. Timken bearings are used on all shafts in the headstock of these lathes, including the spindle. A lever-operated reversing switch is used for start, stop and reverse. There is a positive stop in the neutral position so that the switch cannot be carelessly thrown from forward to reverse. Eight speeds are provided by the geared headstock. Quick-acting lever controls are provided on the apron.

Universal Measuring Microscope Reads to 0.00005 in.



Range of the improved universal measuring microscope offered by Carl Zeiss, Inc., 485 Fifth Ave., New York, N. Y., is 8 x 4 in. It is adapted especially for accurate measuring of screw thread gages, lead screws, chasers, hobs, taps, worms and similar items by the knife edge method. It is equally suitable for checking cylinders, tapers, templets, form tools and small jigs. Readings are made on glass scales with microscopes and an optical spiral vernier to 0.00005 in. Base and measuring slides have been redesigned to increase their rigidity, and hardened and lapped steel ways have been provided for the slides. Objectives for magnifications of 10X, 15X, 30X and 50X have increased field of view. Inclined oculars are provided, as is a protractor ocular reading to 1 min. of arc. Focusing is by fine pitch thread. The dividing center now has an accuracy to 1 min. of arc while the circular table has an accuracy of ½ min. of arc.

Parts 28 in. long and 4 in. in diameter can be held between centers. When the high center cradle is used, a part 10 in. long can be supported. The square table measures 10¼ x 10⅝ in. and the graduated circular table is 8⅜-in. in diameter. This instrument is 49½ in. wide, 50½ in. deep and 28 in. high.

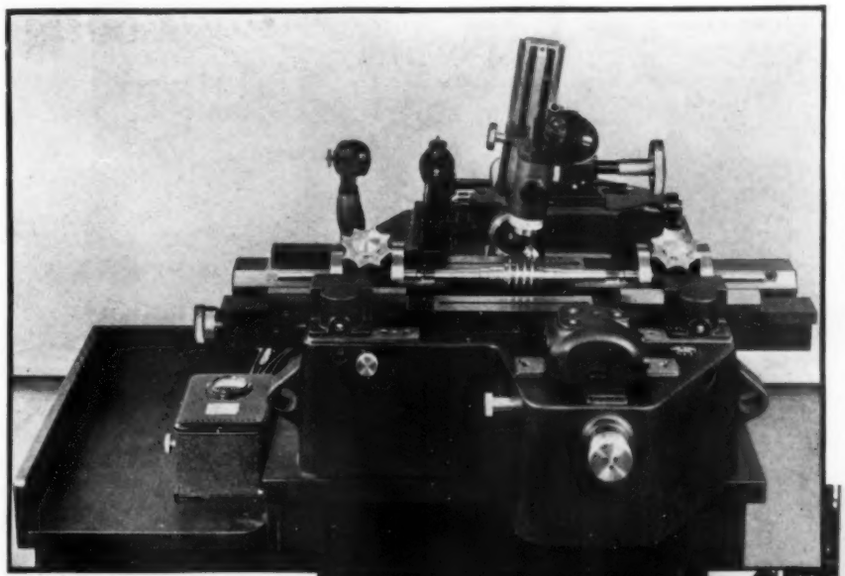
Uniformity of pitch and concentricity of gears up to 6 in. can be checked rapidly with the Orthotest

SHOW IN PRINT

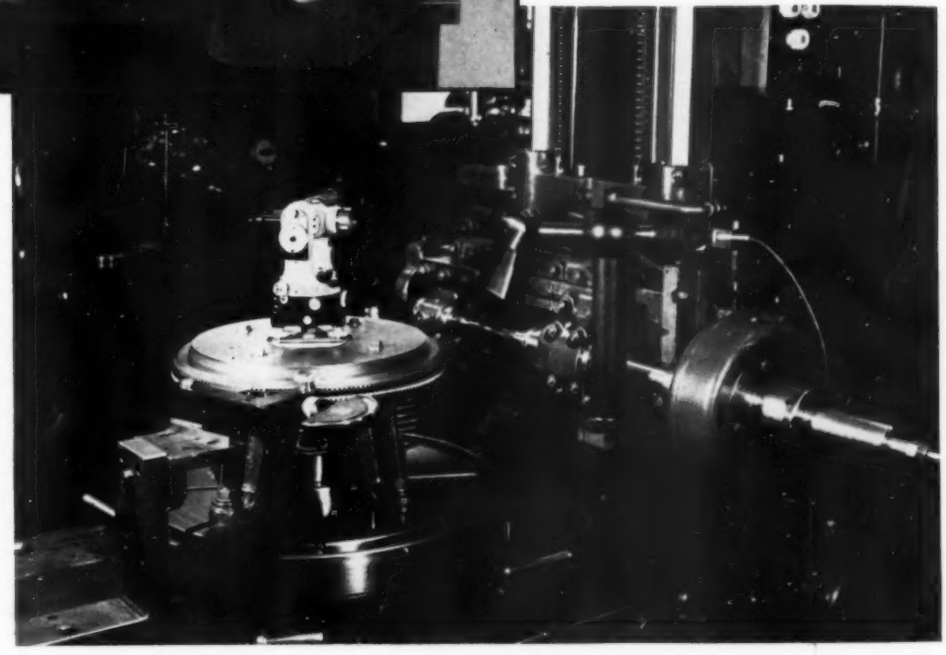
A rapid and accurate means of checking the uniformity of pitch and concentricity of spur, helical, worm, bevel and spiral bevel gears up to 6 in. in diameter is provided by the Zeiss gear "Orthotest." This instrument is especially suitable for checking small gear assemblies, like differentials, for separating gear imperfections from errors in assembly.

The gaging is done by an "Orthotest" indicator which has a range of indication of ± 0.004 in. and reads to 0.00005 in. It is coarsely adjustable for height along the column, and finely by means of a knurled nut and by adjusting the scale segment. The column bracket has a semi-circular guide on which the indicator head can be swiveled around a horizontal axis for testing bevel gears. Work is held on the table between a pair of centers, a special center block being provided for small crown gears in order to prevent collision with the knurled nut on the instrument. A set of eleven contact tips fitting the same holder on the plunger is furnished. All settings can be clamped by means of levers.

Consisting of a theodolite and a collimator, the collimating division tester is intended for accurate indexing work, reading to 1 sec. of arc. The collimator is an optical target with a parallel beam of light functioning as if placed at infinity. The theodolite telescope is pointed at the target line in the collimator. This theodolite is connected with the object under test and the indexing is effected by means of a high precision circular division on glass read simultaneously in two diametrically opposite places. This automatically eliminates residual errors of concentricity. The tester can be applied to hobbing machines, indexing plates, spline gages and precision gears without limit to any diameter of work. Working accuracy of the process is said to be ± 2 sec., equivalent to an uncertainty of about 0.00001 in. at the periphery of a 20-in. diameter gear. This angular precision applies to all diameters.



The improved Zeiss universal measuring microscope provides a non-inverted image in the eyepiece



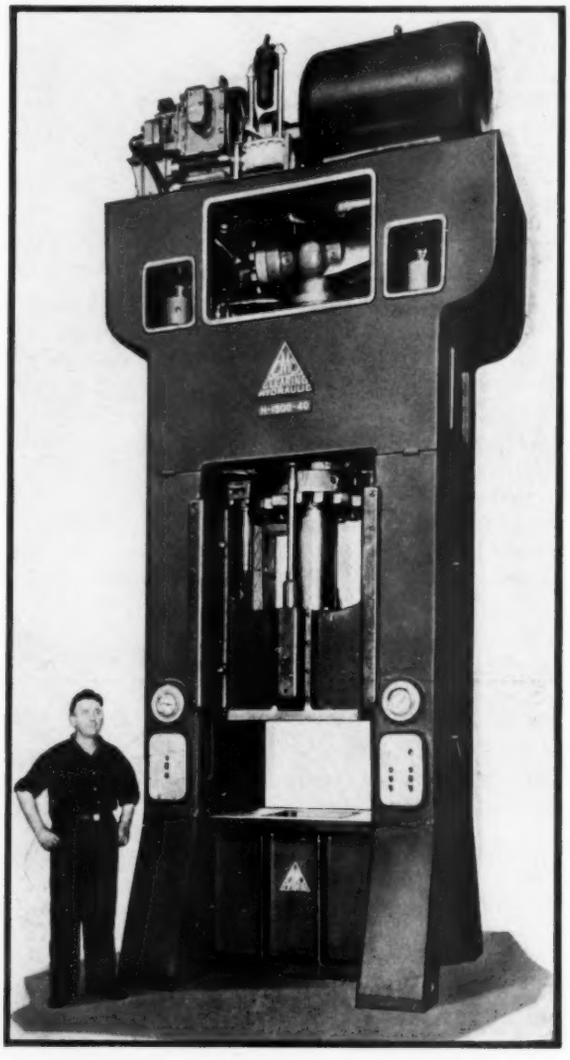
A theodolite and a collimator are combined in the collimating division tester for accurate indexing of both large and small work

Clearing Crankless and Hydraulic Presses Have All Steel Frames

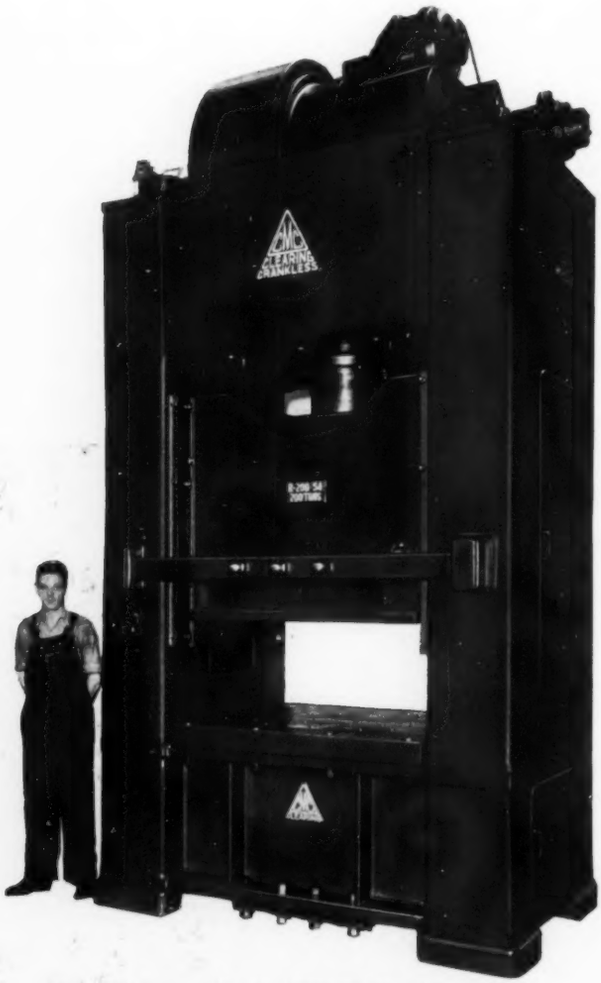
One of a series of medium size crankless presses developed by the Clearing Machine Corp., 6499 W. 65th St., Chicago, Ill., the No. R-200-54 Type R press has a capacity of 200 tons. Bed area is 48 x 54 in. and the press has a stroke of 10 in., with a shut height of 24 in. The slide has an adjustment of 4 in., an area of 42 x 50 in., and is suspended from two points. Combined adjustment and suspension connections are mounted on each side of the slide and inclosed by the upright housings. This construction provides a 67½-in. span between the suspension points and provides a precise slide movement under all load conditions. Slide ways provide full bearing during the working stroke and unbalanced loads may be set up without tilting the slide.

Pitman connections actuate the slide of the No. R-200-54 press through adjustment screw housings mounted on each end of the slide. The wristpin end of the pitman is supported in a hollow plunger and moves in and out of the adjustment screw housing on a screw. These presses have all welded steel frames consisting of a bed, two uprights and a crown spacer. The press shown has a bed opening of 32 x 46 in. and does not require a pit or extra space for installation of additional air cushion equipment. Recesses at both ends of the bed provide inclosures for the motor starting equipment, clutch controls and the air regulating valves for the operation of counterbalanced cylinders and air cushions.

The uprights are hollow box-type structures designed to support the entire drive mechanism. This is accomplished by extending the uprights to the top of the press, and the crown spacer functions only as a spacer between the uprights. The "Crankless" feature is retained by mounting a main gear and eccentric on each upright. These eccentrics are integral parts of



All units of the hydraulic system on the Type H1500-42 Clearing hydraulic press are mounted on the top of the press where they are inclosed by a hood and cover plates



The 200-ton capacity No. R200-54 Clearing crankless press has an air-operated and electrically controlled clutch and interlocking brake assembly mounted on the flywheel shaft

the cast steel drive gear and are supported on short non-rotating shafts. The flywheel rotates on anti-friction bearings and is mounted on the drive shaft with the clutch and interlocking brake assembly. Clutch and brake are air operated and electrically controlled. Symmetry of construction permits the loading of dies in or out of the press from either side. Type R presses are available in standard sizes beginning at 100-ton capacity with a bed length of 48 in.

The single-action, double pressure No. H1500-42 hydraulic press combines the mechanical features of the crankless power presses with a simplified hydraulic operating system. The press shown has a bed area of 42 x 38 in., a stroke of 24 in., and a shut height of 20 in. The dual pressure hydraulic system gives a rapid approach stroke, a high-speed pressing stroke up to a pressure of 175 tons, a slow-speed high-pressure stroke above 175 tons, and a rapid return stroke. These characteristics give the press a speed of 14 strokes per min.

The steel slide is guided on four sides by bronze-lined tapered gibs. The slide ways provide a full bearing during the working stroke and assure precise slide movement under all load conditions. The slide is equipped with a positive sleeve-type knockout arrangement. The press has a bed opening of 18 x 18 in., machined to receive air cushion equipment. This auxiliary equipment is designed to be installed in the press structure and no pits or additional floor space is required.

This press is a self-contained unit. Symmetry of construction and lack of overhanging unit permits loading of dies in or out of the press from either side and adds to the safety of the operator. All of the controls are electrically operated by pushbuttons. Electrical equipment is housed within the frame of the press where it is protected from mechanical abuse.

Three hydraulic rams are employed to actuate the slide. Two small rams provide the quick approach stroke and the quick return stroke. The main center ram incorporates an arrangement which gives a fast speed up to the pressure of 175 tons and a lower speed for pressures between 175 and 500 tons. The change-over takes place automatically when 175-ton pressure has been reached. The hydraulic system is mounted on the top of the press and is fully inclosed by a hood which protects it against grit and dirt. The main surge valve gives rapid and shockless operation. This valve can be serviced in place without dismantling any other part of the press.

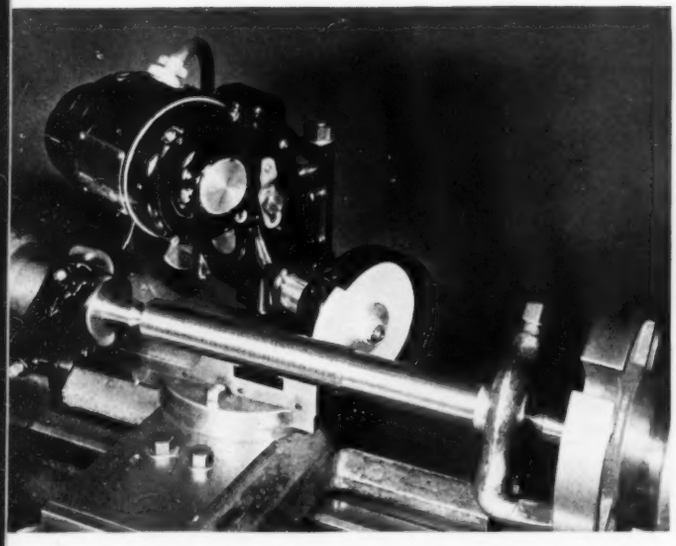
Combination Sawing and Filing Machine Provides for Quick Change Over

By tracking the saw blade and the file chain alongside of each other on the 24½-in. diameter pulleys, a change from sawing to filing or vice-versa can be made in less than a minute on the No. NS-24 combination band sawing and chain filing machine announced by Grob Bros., Grafton, Wis. The pulleys have inlaid rubber bands for the saw blade, while alongside of each rubber band is a groove for the operation of the file chain. The lower drive pulley has provision for a positive drive to the file chain, so that very little tension is required. Tension to the saw blade or file chain is adjusted with a hand crank. An indicator is provided to show the tension applied. The butt welder at the side of the column joins saw bands quickly.

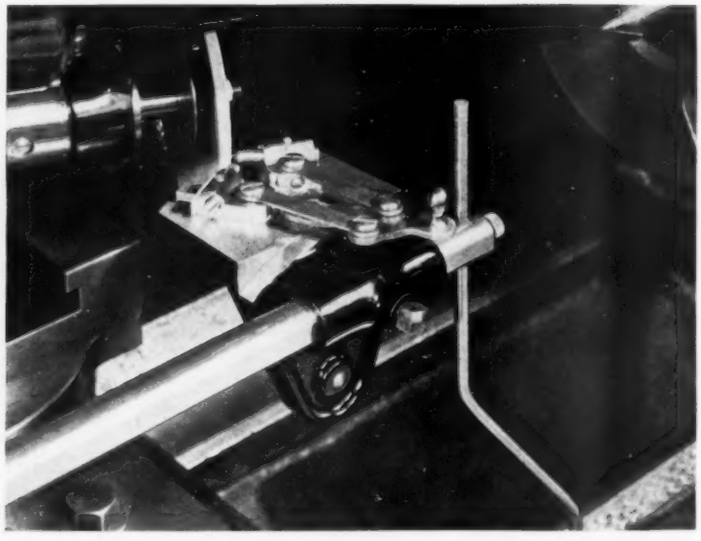
The use of large diameter pulleys provides a throat depth of 24 in. The 24x25-in. table is made of cast iron and tilts in two planes. A table feed is provided, and is operated by a foot lever. Base and column of the machine are of welded steel. The lower pulley is driven by a ½-hp. motor through a V-belt reduction drive providing five speeds of 60, 90, 135, 225 and 375 ft. per min. to the saw band or file chain. Distance from floor to table is 40 in. and over-all height of the machine is 80 in. Distance from table to column is 12⅜ in. Total weight is 15,000 lb. Floor space required, 26 x 42 in. Saw guides and file attachments can be left in the machine at all times.

A butt welder is mounted on the Grob No. NS-24 machine for welding saw blades

Dumore Grinder Attachment Aids Thread Grinding



Grinding wheel can be set accurately to the helix angle of the thread with this tool post attachment for the lathe



The dressing attachment is supported from a clamp on the extended tailstock spindle and by a rod extending down to the lathe bed

A thread-grinding attachment arranged properly to position a Dumore No. 5 grinder for finishing threads accurately in a lathe, has been developed by the Dumore Co., Racine, Wis. This holder can be tilted so that the grinding wheel is set at the helix angle of the thread. The equipment provided consists of a mounting post for the grinder, a wheel dressing attachment, wheel guard, a set of coarse and fine grinding wheels, and a steady rest for the dressing attachment, all fitted into a steel carrying case. The standard unit is arranged for grinding U. S. or standard threads. A dressing attachment for Acme or special threads also is available.

In setting up this attachment, the lathe compound is set parallel to the ways of the lathe, so that the grinder can be moved sideways to grind either side of the thread, or both. Once the attachment and grinder have been assembled on the lathe, the grinder is adjusted to the correct helix angle and brought up to the center of the work. It then is locked in place. The dresser clamp is mounted on the extended tailstock spindle and the dressing attachment clamped as close to the tail spindle as possible, and with the support rod adjusted to a solid part of the lathe. The same helix angle as was adjusted on the mounting of the grinder also is set on the dressing attachment. The wheel of the grinder then is brought into position and the grinding wheel is dressed by the stroking action lever of the dresser. After the wheel has been dressed, the dressing unit is removed from the tailstock clamp, and threads are ground in the same manner as a thread is chased.

Rasmussen Power Hacksaw Has Automatic Stock Carrier

The Type B "Sawmore" metal cutting power hacksaw announced by Rasmussen Machine Co., Inc., 1014 Eighth St., Racine, Wis., is made in two sizes, rated at 6 x 6 in., and 10 x 10 in., both with the full automatic carrier and manually operated without the carrier. A four-speed gear box transmission incorporated in each of these machines provides cutting speeds of approximately 60, 90, 125 and 150 strokes per minute. These machines swivel up to 45 deg. and angles may be cut automatically.

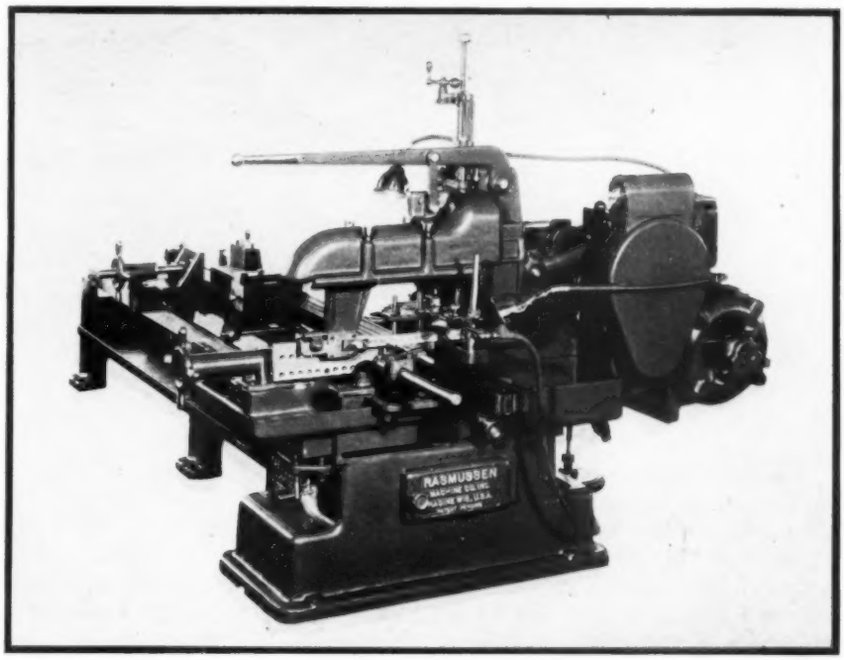
Standard length of the stockfeed table for full automatic stock handling is 12 ft. However, these machines have capacity to move forward stock in bars up to 24 ft. long, it being necessary only for the operator to move the carrier vise back on the stock after the machine has cut a number of pieces. If this is done while the machine is cutting, no machine time will be lost. Where necessary, special length carriers up to 20 ft. in length can be furnished.

A positive clutch feed is provided and is so arranged that it allows for compensation as the saw blade encounters more metal, or becomes dull,

thereby assuring maximum cutting capacity for each stroke of the blade. Feed is applied on the saw blades during the complete stroke and, therefore, the machine is adaptable for using the two-tooth blades as the first tooth removes its complete chip the continued downward feed allows the progressing teeth to also take a full cut.

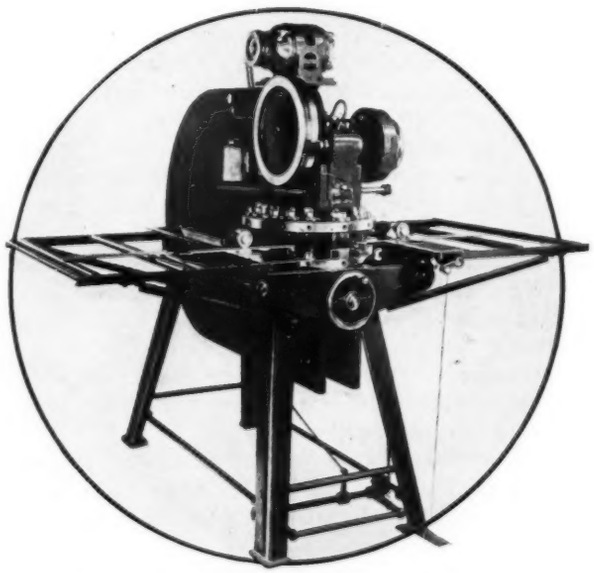
To insure long blade life, the saw frame is mounted so that excessive tightening of the saw blade will not cause distortion of the frame bearing surface.

Gaging the length of cut is done by a spacer bar and scale mounted on the side of the carrier. This eliminates saw breakage caused by pieces becoming jammed against end stops. A counting dial is standard equipment and may be set for the number of pieces required.



Type B "Sawmore" metal cutting hacksaws can be operated manually or automatically

Wiedemann Turret Punch Has 12-Ton Capacity



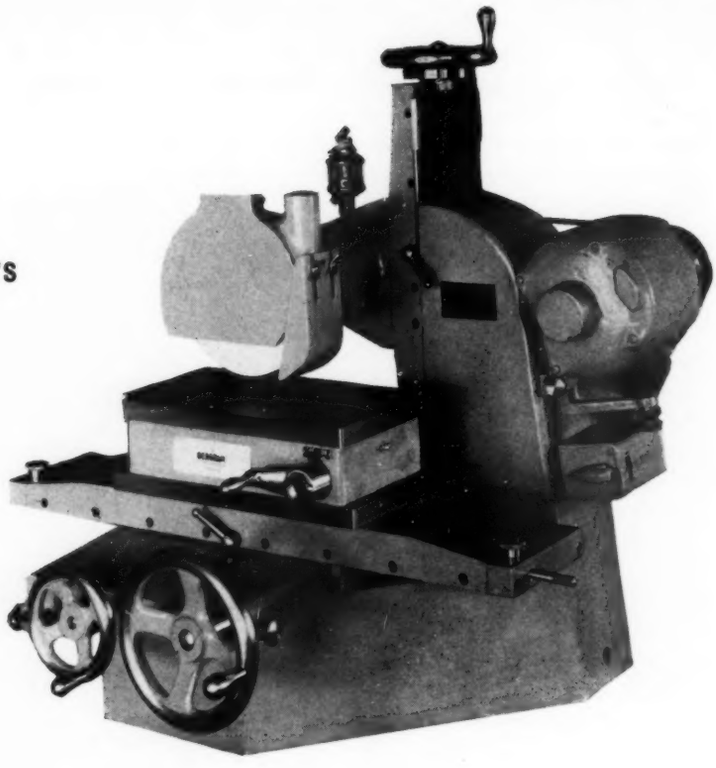
Punches and dies as large as 3 in. diameter can be held in the turrets of this motor-driven punch

Capable of exerting 24,000 lb. pressure and having capacity for punching $\frac{1}{2}$-in. diameter holes in $\frac{5}{16}$-in. thick mild steel, the Type R-41-P motor driven turret punch press being exhibited by Wiedemann Machine Co., 1815–31 Sedgley Ave., Philadelphia, Pa., is available with throat depths of 18, 24, and 28 in. Turrets having 12, 14, 16 or 18 stations can be mounted in this machine.

The power-driven upper turret head is a complete unit driven by a 1-hp., 1,800-r.p.m. motor V-belt connected to the flywheel. Final drive is by spur gears through a four-tooth clutch having renewable teeth. Clutch is mechanically interlocked so that turret must be fully indexed and locked before the clutch can be tripped. The gage and table mounted on this machine has a gage bar which moves endwise with the work.

A positive indexing device locks the revolving turret when the selected punch and die have been located under the ram. Specifications: Clearance between the dies and strippers, $\frac{7}{16}$ in.; stroke of ram, $\frac{5}{8}$ in.; speed, 100 strokes per min.; length of machine, 67 in.; width, 36 in.; height, 72 in.; net weight, 2,400 lb.

Bergram Bench-Type Grinders Suitable for Small Work



The Type S-1 Bergram bench-type surface grinder has a 5x12 in. table

The Type S-1 bench-type surface grinder developed by Bergram Mechanical Engineering Co., New Britain, Conn., is provided with a permanent magnet type chuck which can be quickly demagnetized by turning a handle. The precision ball-bearing mounted spindle will carry a wheel as large as 6 x ½ in. An adaptor is furnished for mounting small wheels for groove grinding.

Standard table size is 5 x 12 in. and the grinding range without magnetic chuck is 4 in. wide, 10 in. long, and 5 in. high. With the magnetic chuck, the range in height is reduced to 2½ in. There is a fine-pitch wheel feed with dial calibrations of 0.0005 in.

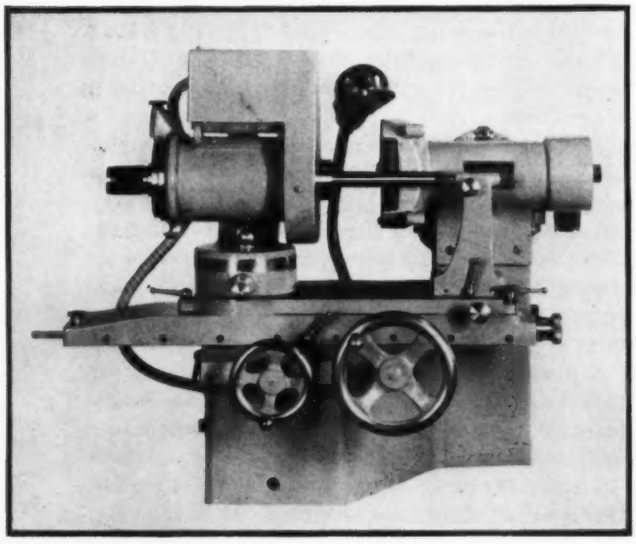
Like the Type S-1 surface grinder, the Type EG-1 bench-type cylindrical grinder has a welded base and column and is fitted with a precision spindle. This is a slower speed machine and can be used with wheels up to 5 in. in diameter.

Developed especially for single-purpose production operation, and suitable for use for grinding straight, tapered or beveled holes to precision limits, the Type IG-1 internal bench-type grinder can be quickly changed over for job-lot grinding. Machine frame is a welded steel column and base, stress-relieved after welding. Table longitudinal and cross feeds operate on dovetail slides. Fast longitudinal feed is through rack and pinion, with slow motion through screw and graduated dial. Cross feed is controlled entirely through a screw and graduated dial.

Wheel spindles of this grinder are removably mounted in a bracket attached to the column face and are interchangeable over a wide range of speeds from 8,000 to 35,000 r.p.m. These spindles have taper sockets for removable wheel arbors or chucks. Speed range is obtained by pick-off pulleys on the spindle and motor. Drive is through a flat belt from a ⅓-hp., 10,000-r.p.m. universal-type motor cradled at the back of the column to permit belt tension adjustment.

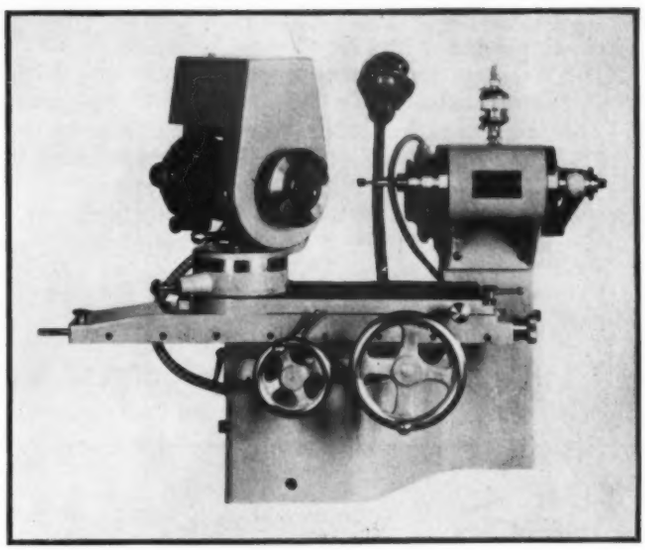
Workhead spindle is mounted on precision ball bearings and is driven by an individual single-phase motor at 300 r.p.m. Internal bore of this spindle accommodates No. 5C collets and step chucks. The nose of the workhead spindle has a taper and bayonet latch to hold faceplates or jaw chucks.

The workhead unit is mounted on a swivel bracket by means of which it may be tilted vertically or swiveled horizontally. The bracket is mounted on the table



A 5-in. diameter wheel is used on the Type EG-1 bench-type cylindrical grinder

through a horizontal swiveling unit with a spring latch for holding the zero position. Capacity of the machine covers all sizes of holes from $\frac{3}{16}$- to 3-in. diameter. A diamond dresser to control selected hole size is arranged for mounting on the table.



Spindle speeds up to 35,000 r.p.m. are available on the Type IG-1 bench-type internal grinder

High-Speed Swiss Jig Borer Features Convenient Control

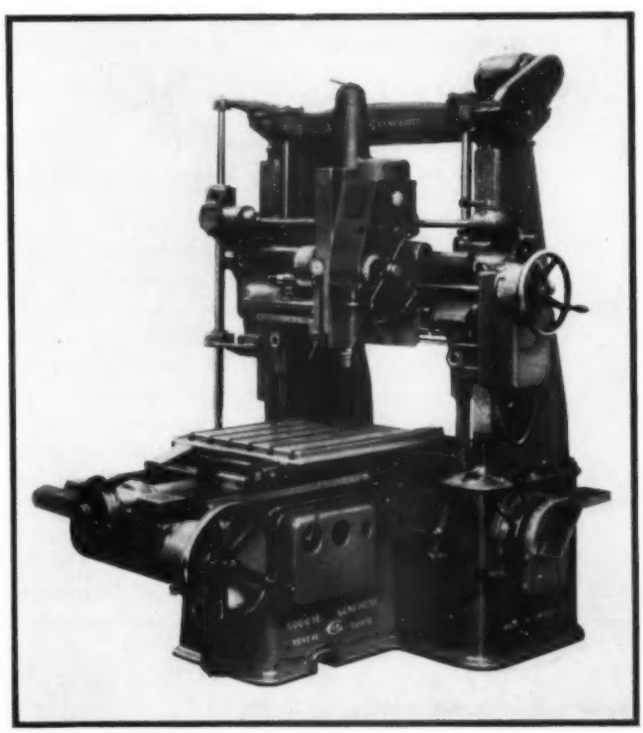
A No. MP-4G Societe Genevoise jig boring machine having a spindle running in ball and roller bearings is offered by Triplex Machine Tool Corp., 125 Barclay St., New York, N. Y. It has a 24 x 20 in. measuring range and a boring range of 9-in. diameter. The spindle provides 20 speeds ranging from 50 to 2,000 r.p.m. and there are six power feeds ranging from 0.001 to 0.012 in. per rev. of the spindle. This range permits the efficient use of tungsten carbide tipped tools and provides for the satisfactory performance of borizing operations.

Controls are convenient and settings can be made rapidly. The measuring screws on the rail and table are provided with automatic correcting devices, and both the work table and the spindle head settings are read to 0.00005 in. on built-in micrometer heads. Accurate vertical measurements are obtained from equipment built into the spindle head and used in conjunction with gage blocks.

Individual motor drive is provided for both the rail and the table, as well as for the spindle, and the machine has an auxiliary motor for the rapid traverse movement of the spindle head. When closed, a table clamping lever cuts out the electric table feed which, in addition, cannot be operated as long as the hand drive to the table is not disengaged. Built-in electric lights facilitate readings on the micrometer drums and auxiliary scales.

Adjustable indexes facilitate approximate settings of the table and head by readings on scales mounted in the ways of the bed and cross rail. The spindle quill can be raised or lowered rapidly, and the power feed engaged by means of push-and-pull levers mounted at the side of the head. Power feed to the spindle is cut out automatically at a predetermined depth which can be set and read on a dial at the side of the head.

A larger No. MP-5G jig borer of the same design

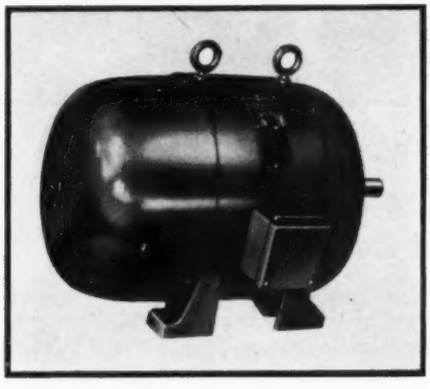


The No. MP-4G jig borer can be used for precision production boring operations with tungsten carbide tipped tools

also has been announced. This machine has a measuring range of 36 x 28 in. and a boring range of 9-in. diameter. In addition to power movements of the work table and cross rail, this machine incorporates power movement of the spindle saddle along the rail. These jig borers are built in Geneva, Switzerland, by Societe Genevoise D'Instruments de Physique.

Specifications for the Type MP-4G jig borer: working surface of table, 27½ x 23⅝ in.; longitudinal travel of work table, 24 in.; transverse travel of spindle saddle, 20 in.; distance from top of table to end of spindle, 5–22½ in.; free space between uprights, 34¼ in.; vertical traverse of cross rail, 18 in.; drilling capacity, 1½ in. in soft steel and 2 in. in cast iron; travel of spindle quill, 7 in.; main driving motor, 3 hp.; auxiliary motor for table traverse, ½ hp.; auxiliary motor for cross rail traverse, ¾ hp.; net weight, 5,860 lb. The machine is 82 in. long and 80½ in. wide.

Howell Type K Totally Inclosed Motor Reverses Rapidly



Improved Type K Howell motors are dynamically balanced to close tolerances

Howell Electric Motors Co., Howell, Mich., is offering an improved Type K totally inclosed, fan-cooled electric motor in which castings on the outer shell have been eliminated. This motor is lighter in weight and has smaller over-all dimensions than previous motors of the same type. They are designed especially for fast reversing service. Stators are internally ground.

Insulation on the windings is impregnated with water-, oil- and grease-proof varnish which is able to withstand temperatures of more than 350 F. It also is acid and alkali resistant. Rotors are of a rolled copper end ring construction welded or brazed together. The rotors are dynamically balanced and can be reversed end for end in the stator. Full cartridge bearing construction is employed with double row bearings being used on the drive end and deep-groove single row bearings on the opposite end. The cartridges are of three-piece construction, permitting the removal of the bearing without taking off the endplate. Shafts have end-milled keyways.

The external cooling fan is of one-piece split hub aluminum construction with no threads or nuts on the end of the shaft. Outer endbell is of heavy pressed steel with ventilating holes of minimum width. The center hole is large enough to permit the use of a tachometer, but too small for the insertion of a finger.

Palmgren Quick-Change Chuck Released Instantly

Drills can be changed with safety without stopping the machine when held in the improved Palmgren quick-change safety drill chuck offered by Chicago Tool & Engineering Co., Inc., 8389 S. Chicago Ave., Chicago, Ill. Drills are released instantly by a slight upward movement of a free moving knurled sleeve. In addition to the easy-insertion and quick-release features, the chuck is designed so that drills can be held tighter by screwing up the outside shell for extra heavy-duty work. Even after tightening the grip by this operation, drills can be released instantly by the upward movement of the sleeve as before.

This chuck is strictly hand-operated. Construction is such that it is well balanced and worn parts can be replaced quickly without special tools. It is available in ¼-, ⅜-, ½-, ⅝-, ¾- and 1-in. sizes. Each size of chuck takes a wide range of drills.

The hand-operated Palmgren safety drill chuck permits changing drills without stopping the machine

GAGING BUSINESS

Private industry buys heavily to avoid price increases and long deliveries. Most future business, however, will result from defense needs here and abroad.

In response to the biggest buying boom in years, the metal-working industry has expanded its working forces and accelerated production since the European war started. Customers have scrambled to place orders for delivery as soon as possible. Large machinery buyers who have hung back from making sizable capital expenditures the past few years have suddenly decided to make purchases while they still can get what they want without interminable delays. A feature of the market is the return of private industry as a powerful buying factor. On the other hand, much of the business which manufacturers foresee is tied in with national defense or with war needs abroad. Direct government buying, particularly for rearmament, continues to accuculate in impressive volume.

MACHINE TOOLS—An avalanche of orders has cleaned most machine tool builders out of stocks of finished machines and has greatly lengthened deliveries. Reversing recent experience, when export buying was dominant, most of the current business comes from U. S. manufacturers. The spurt in sales is not confined to any particular type of machine or to any industry, but is general. Metal-working plant executives see big production days ahead and are preparing for them. It will not be surprising should the index of orders of the National Machine Tool Builders' Association this month shoot up near an all-time peak. The Index in August stood at 206.5 compared with 230.9 in July. Machine tool builders have added to their forces, in many cases putting on a third shift. Despite quickened output, few companies have many machines available for fourth quarter delivery and some are quoting April as the earliest date.

AIRCRAFT—Airplane builders are booked at capacity months ahead on orders for the U.S. and foreign governments. West Coast factories are reported expanding output to about $25,000,000 a month. Their backlogs now total $100,000,000. Companies with British and French orders will continue to make planes and store them, hoping Congress will change the present neutrality law. Large quantities of aircraft parts destined for France are said to be piling up on New York Docks awaiting the lifting of the embargo. Curtiss has received another $5,000,000 army contract for speedy observation planes.

STEEL — Swamped with business, steel mills are running at 79 per cent compared with 59 per cent only two weeks ago. Though steel users are operating at higher rates, much of the fresh tonnage is to bolster low inventories and to protect consumers against lengthened deliveries and against the possibility of higher prices later on.

RAILROAD EQUIPMENT—Feeling that the war boom will sharply boost car loadings, carriers have called back thousands of men to repair and rebuild cars. They also have bought or expect to buy large numbers of freight cars, locomotives and rails. The Pennsylvania alone will spend $17,000,000 for equipment and properties. It will build or purchase 2,500 freight cars and 20 electric locomotives and will repair 17,500 freight cars. Some roads are moving ahead 1940 equipment buying programs to the fourth quarter.

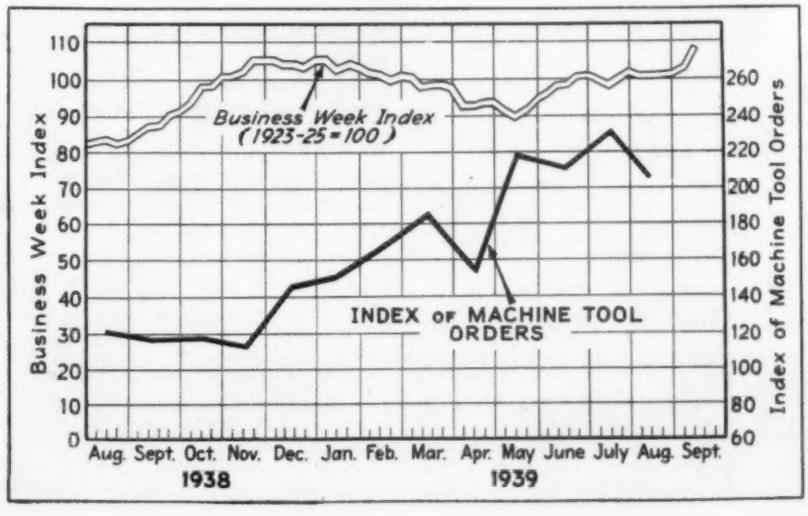
SHIPBUILDING—Work is being speeded up on ships for the Navy and for the Maritime Commission. With eastern yards fully engaged, Pacific Coast yards are getting busier. The Maritime Commission now has eleven ships valued at $11,000,000 being constructed in the far west, the latest award being five C-1 cargo boats to Bethlehem's Union Iron Works yard at San Francisco.

GEARS—Gear sales last month were seven per cent better than in July and 26 per cent ahead of August, 1938.

FARM IMPLEMENTS — Manufacturers believe the boom in grain and livestock prices is bound to bring increased sales of farm implements and tractors, though the full impact will not be felt until next spring. Unless the bottom drops out of the market, the industry is figuring on stocking dealers for 1940 business on the basis of at least 10 per cent more volume than this year.

TOOL BUYING VS. GENERAL BUSINESS

Pre-war indecision is reflected in the machine tool buying slump, while general business activity increases sharply with declaration of war



WATCHING WASHINGTON

McGraw-Hill Washington Bureau

PAUL WOOTON, CHIEF

Activity in all quarters centers on affects of possible neutrality law changes. Expansion of defenses pushed.

WASHINGTON — Visiting around Army, Navy, Maritime Commission, you get the impression everybody is calmly getting ready for trouble. But they haven't assumed by any means that we can't keep out. Nobody, not even the big bosses of government, claim to know what will happen. They say that Hitler and Chamberlain didn't know, that they went too far and one morning found themselves stuck with a war.

Either repeal or re-affirmation of the arms embargo section of the neutrality law would be neutral, say the most rational observers here, since either action would apply to both sides alike. So long as one side has control of the Atlantic, there can be no such thing as neutrality. What Congress has to decide is which side to be neutral against.

If the arms embargo is re-affirmed by Congress, Washington believes there will be a quick expansion of American airplane and other branch plants in Canada, with just as quick establishment of new plants by some American and Canadian interests. In that case, much of our best engineering and mechanic skill will trek Northward. This would tend to alleviate domestic unemployment, but it would partially cripple home plants with some grade B skill. But the odds are heavy in favor of repeal. Foreign buyers avoid embarrassing the President by openly placing orders, but they are negotiating with manufacturers in hotel bedrooms. One Canadian firm, however, openly placed an order for $83,000 worth of Kinner aircraft engines.

If arms embargo is repealed, authorities here expect over-expansion of munitions plants, especially aircraft, despite all warning of post-war collapse. Suppliers to the Army and Navy will rush for high-priced foreign orders, and the government may have some trouble keeping up the rate of its own expansion program. Export will depend much on British and French credits. Their "money" won't last forever unless Congress repeals the Johnson law so we can extend them long-term credit to buy our stuff. The President says he hasn't heard of a move to repeal the credit law, but watch for it.

Anybody who thought Roosevelt wouldn't enforce the arms embargo, whatever his motives, was wrong. The State Department's Munitions Control Board now demands assurances from neutral arms consignees adjacent to countries at war that goods will not be passed on to belligerents. Statistics released by the Board indicate that some $50,000,000 worth of arms exports have been stopped since invocation of the law. August showed shipments of $4,955,000 while export licenses totaled only $3,687,000. But more than the overplus was licensed during previous months.

To Increase Educational Orders

The educational orders program of the War Department would fade out of existence if this country should become involved. Obviously the present get-acquainted orders would be boosted to huge emergency orders, and there would be no time for education as such, except in so far as he who runs may learn.

But if this country doesn't mix in

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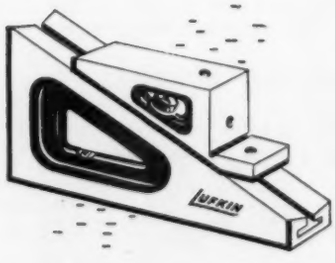

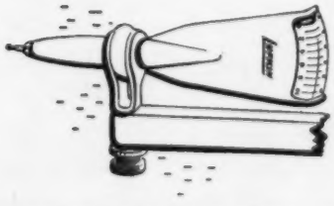

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TAPES — RULES — PRECISION TOOLS

the squabble, and if the threat of trouble hangs on, War officers believe the "orders" program will be greatly expanded by the next session of Congress. Thus, it appears to be the most practical way of taking industry into the mobilization plan at the lowest cost.

Meanwhile, only one circular has gone out, since the award of the original six items of last year, for which Congress gave the Department $2,000,000. A circular is a vastly complicated and detailed call for bids in the form of a specification. Circulars are sent only to manufacturers regarded as competent to meet the exacting requirements, and who are financially sound and likely to stay in business.

The one circular that has gone out under the 1940 program, for which Congress provided $14,250,000, is gas masks. Last year's six-item list also included gas masks, and an award was made to Goodyear. Presumably the new circular has gone to other companies, as the War Department feels that this item may be needed in great numbers.

What is regarded as a full list of critical items totals 55. It is difficult to say which of them is most important. Their relation is like the links of a chain; none can be dispensed with. Included are ammunition, fighting vehicles, defensive chemicals, artillery light and heavy, small arms, automatic rifles, communications devices, gas defense devices.

Circulars on all 55 are nearing completion. Most of them will have been mailed out by October to chosen prospective bidders. So arduous is the work of placing a bid on the intricate specifications (speaking of most items) that 75 to 90 days are required. A civilian board was recently appointed by the educational orders committee to assist in coordination between the Service and industry.

Officers in charge of educational orders told *American Machinist* that many manufacturers are wasting their own time and that of the officers by calling in Washington to solicit business. Many industrialists are under the impression that educational orders are a form of subsidy and that any firm is eligible for a contract. The War Department asks that manufacturers study the law, and that they do not come to Washington unless called.

A total of $32,500,000 was authorized to be spent for educational orders during 1940-41-42. The $14,250,000 which was appropriated probably will be all committed this year. That leaves $18,250,000 for the next two years. After that, for four more years, there are authorized, under an older act, $2,000,000 per year.

Merchant Marine Expansion Pushed

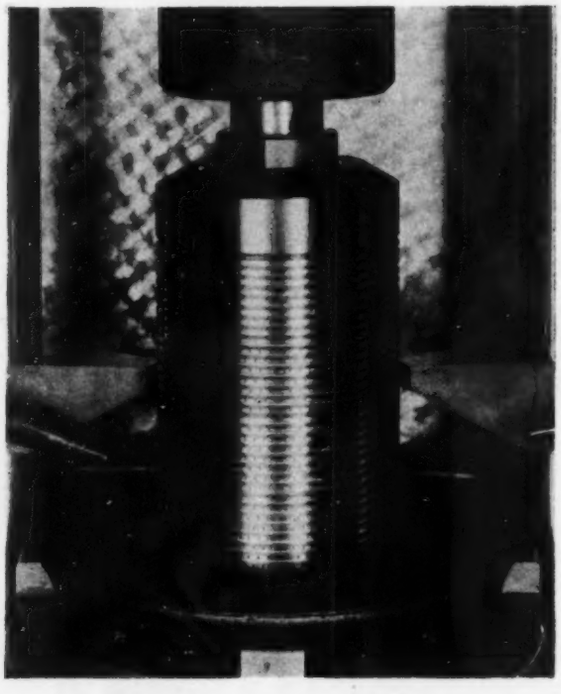
Charged with building a merchant fleet which can keep this country on world trade routes against low-cost competition, handle its commerce when other countries withdraw their ships in war time, and create an adequate supply train for the Navy, the Maritime Commission, behind a neutrality mask, is making haste on two fronts: First, it is surveying the job of commissioning part or all of the laid-up fleet of 113 war surplus ships. Second, it is vigorously expanding its building program of standard C-1, C-2, and C-3 cargo ships for operation on subsidized American flag foreign-service lines and on its own lines.

Some 65 of the laid-up bottoms are in the James River at Norfolk, Va., and the rest are in fresh water at New Orleans. All have been carefully maintained in grease and paint, and are reported in good condition. Most were drydocked and inspected in recent years. All are steel; the wooden ships were long since burned, and the concrete monstrosities were broken up for stone. Until a survey is completed, it will not be known just what machinery replacements and repairs are necessary. Some of the boats were run a great deal after the war, and were tied up in need of overhaul. Others are nearly as good as new. Four of them were German vessels, seized during the World War. Marine engineers point out that ships reconditioned with modern machinery will be faster than when they were built.

The laid-up ships will be commissioned only if war seriously threatens. It has never been the Commission's intention to put them on the market in competition with its own efforts to place in the hands of operators new ships which will be less wasteful of operating subsidy money, and which can meet competition in sea commerce. Had there been no war trouble, the old ships were destined for the scrap man's torch.

On its new-construction front, the commission, in the last few days, has awarded contracts for fifteen C-1 cargo ships, bringing its total under construction and order to 108. In addition, it has called for bids on twenty C-2s and six C-3s for its own account, and seven special designs for operators under subsidy. Awards on these calls will bring the modern fast merchant fleet to 139. It is estimated the Commission could double its self-set quota of 50 per year to 100 by lending technical aid and finances to builders hitherto on the margin of eligibility. Speed would be greatly aided of course by the Commission's standard design.

Awards: Five C-1 to Bethlehem Steel at $1,889,000 each, five C-1 to Bethlehem's subsidiary, Union Iron Works, San Francisco, at $2,002,000 each; five C-1 to Bethlehem at $1,909,000 each.



Starting a Part off *Right!*

OCCASIONALLY you will still run across the misconception that broaching is economical only in large-scale production. True, in mass production broaching is cheaper and faster than other machining methods.

But even if speed is not a factor, broaching still retains its primary advantage: *consistently maintained accuracy.*

Compare the example above—broaching the I.D. of big steel tractor ring gears—with, say, doing the same job with a single-point boring tool. The broach (built up of rings 5½ inches in diameter) may cost more initially but it saves money in the end. *It stays put.*

Broaching starts the part off right and cuts rejections later.

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Activity in the Navy

Navy moved to prepare for the "limited" emergency—and also for an *un*limited one. Forty of its 103 overage destroyers will be put into commission for coast patrol. (Newest are seventeen years old.) Many of these boats need only degreasing and painting and replacement of equipment which is in storage. Others will need extensive machinery repairs but the amount is not disclosed. . . . Acting Secretary Charles Edison has ordered three shifts on naval building wherever possible. . . . At his third press conference in as many years, he stressed the need for "original" naval research, said that most of the $20,000,000 experimentation fund is being used for mere improvement of existing design, and announced he had transferred the Naval Research Laboratory from the Bureau of Engineering to independent status. Probably he will ask Congress for more research money.

Strategic Materials Plan Stymied

Outbreak of war in Europe caught the government flat-footed with its $100,000,000 strategic materials stock pile plan, for which Congress voted $10,000,000 to be spent in 1940. Some of the materials, designated as strategic by the Army and Navy Munitions Board, produced only by the now-belligerent countries, are already unavailable. All haste is being made to corral what can be had of the doubtful items.

More War Headaches

There will be a fight on Hull's reciprocal trade program; half of this country's total normal exports are to countries now belligerent. . . . It will be proposed in special session that automatic reduction under wage-hour law from 44 to 42 hours maximum work week, which takes effect October 24, be suspended in the interest of fast production. . . . Repeal of the Johnson law which prohibits loans to creditor nations will be proposed. . . . If the Johnson law is not repealed there will be sharp practices at stretching ordinary commercial credit to have the effect of loans. . . . A British 50-m.p.h. torpedo boat pulled into New London Electric Boat Company works for tests and Washington sailors wonder if it's like some the Navy is building. . . . Thurman Arnold, chief of the trust-bust division of Justice Department, says positive control of some industries may be necessary; he probably refers to natural resources. . . . Substituting the South American market for Europe during the war might nourish general industry all right, but it wouldn't sustain machinery and tool exports.

INSIDE DETROIT

By Rupert Le Grand

DETROIT EDITOR

Automobile executives expect a 20 per cent increase in production, weigh wisdom of tooling up for armament manufacture.

DETROIT—Production of 1939 model cars and trucks in the United States and Canada was 3,475,000. If the predicted 20 per cent gain for 1940 materializes, some 4,200,000 units will be assembled, without counting the effect of the war on Canadian and American exports. Projections for the last quarter indicate that the passenger car output will be approximately 950,000 units as compared with 869,000 a year ago. Chevrolet is late in starting assemblies and others are cautions until the sales outlook clarifies.

Sales people with the big three do not expect the war to have an immediate effect on domestic sales. Later, domestic buying may increase in fear of advancing prices, and some people will have more money through war business. Car prices are expected to advance if the war continues. Rural demand for used cars has not increased because the rise in farm prices is of such short duration. The war has reduced export of cars and trucks to Europe and Northern Africa by about 50–75 per cent. Much business is being held up pending definite commitments that all risk is taken by the shipper. Foreign interest is mostly in trucks, and the prospects are very good if satisfactory arrangements can be made.

Consider Munitions Production

Though a new automobile season is at hand, with the New York show less than a month off, chief new developments have been in connection with manufacture of war materials. Makers of aircraft parts and accessories in this area are going full blast on orders for materials needed to complete planes and engines for the British and French governments. The assumption on the part of the main contractors is that the U. S. embargo on shipments to the warring countries soon will be lifted by Congress.

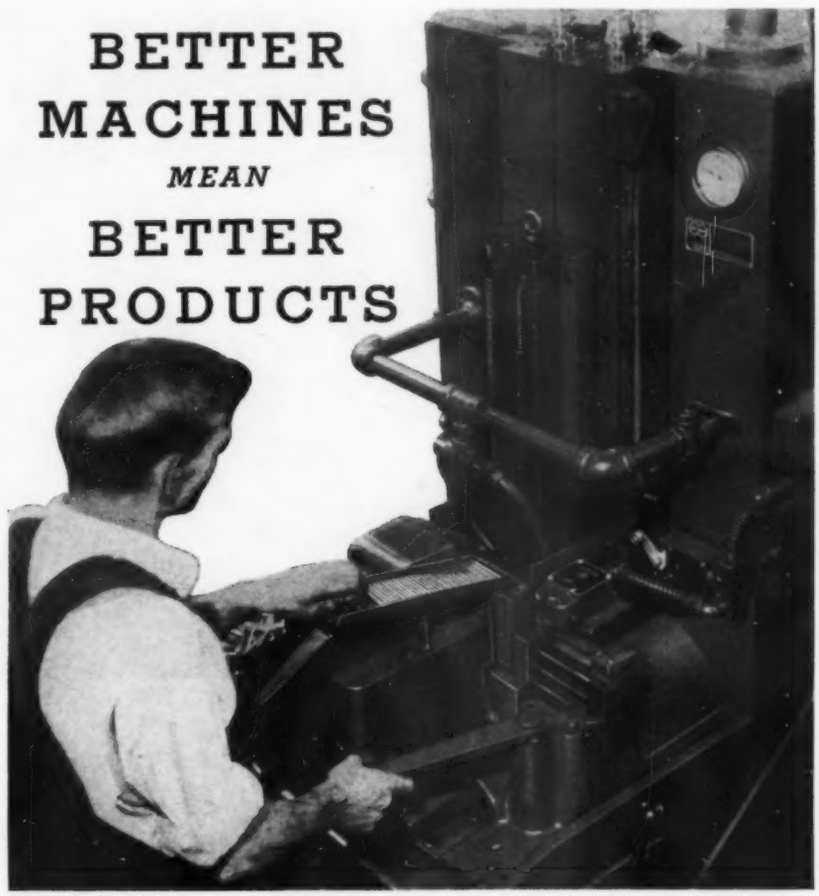
If the present law is changed, shell production for Great Britain will get off to a good start. A Toledo company is reported taking equipment destined to make 155-mm. shells for the English. Before war was declared this company had a contract for 150,000 shells, with 100,000 to be added following the outbreak of hostilities.

One setback to the Allies, however, has been provided by Henry Ford. His Lincoln division has shelved plans, according to reliable reports, for tooling up for an aviation engine for the French government. This engine was to have been the Merlin of Rolls-Royce design. The job was undertaken by the Ford people, so the story goes, against the sincere convictions of Henry Ford who is opposed to war. Mr. Ford finally decided that he would not go ahead with the project and called a halt to it two weeks ago. Ford manufacturing executives and purchasing officials meanwhile had spent considerable time in Paris over the past spring and summer in connection with the program.

Tool Up for '41

Because of the sudden rush of machine tool buying following the declaration of war, some automotive executives already are starting to

BETTER MACHINES *MEAN* BETTER PRODUCTS



● The trend in American Industry is sharply toward giving better value—by cutting costs, improving parts or the whole, by smoothing and speeding the way to production.

Only constant alertness—sharpest scrutiny of production methods can give a producer a place in this marching parade.

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BROACHING MACHINES AND PRESSES

think about tooling up for 1941. It is known, for example, that Chrysler Corp. master mechanics have been instructed by the management to prepare a list of machines needed for 1941.

One of the large automobile companies appears slated to make large quantities of 75-mm. cartridge cases in wartime and may get an educational order for this item soon. The attitude of its management, however, is that the company, after all, is in the business of making automobiles and that is and should be its main object at all times. Its entire capacity is now utilized in making cars and it is not willing to go in for munitions production in advance of war unless it is properly compensated for diverting its capacity and attention away from building cars and trucks.

Motor car assemblies now are approximately 50,000 a week and soon will surpass that mark as Ford gets into heavier production and Chevrolet swings into operation.

Expect Comparative Labor Peace

The National Labor Board elections in thirteen plants of Chrysler Corp. on Sept. 27 are expected to clear the atmosphere of UAW-AFL claims to substantial membership in the auto industry. Corporation executives expect that all plants will choose the UAW-CIO, but the union is afraid of the "neither" vote in the Kokomo plant. From 60,000 to 70,000 men will vote. Homer Martin's belated action in demanding that the Labor Board "immediately withdraw the name of our organization from all ballots in the Detroit area" was unavailing in the Briggs election last Thursday. The Board reserved the right to remove that faction's name from the Chrysler ballot.

Martin asserted that conditions in Detroit are such as to "make impossible an honest election," and charged bias in favor of the UAW-CIO to the Regional Labor Board. His action was construed as being an unavailing last-minute retreat in face of CIO claims to 90 per cent of the 21,000 Briggs workers.

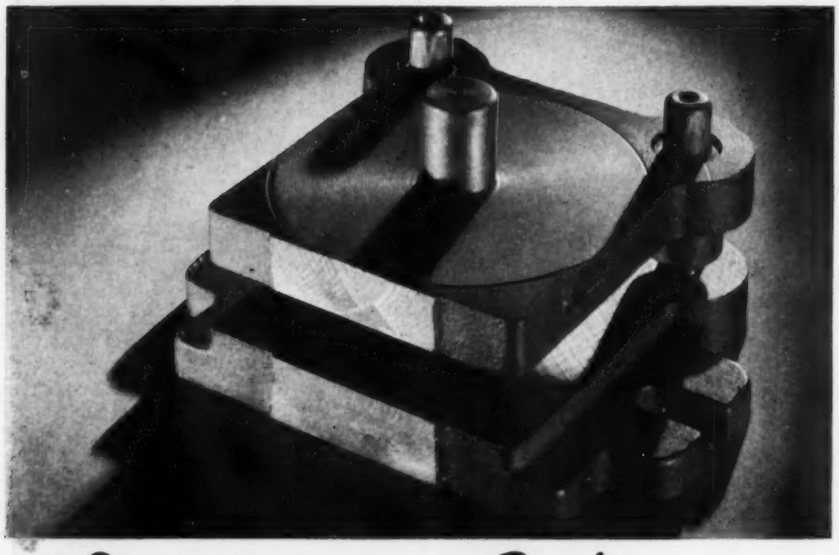
Avoidance of a further demonstration of poor strength in the Detroit area at this time is considered to be the reason for Martin's statement that his faction would "probably withdraw" petitions for NLRB elections in General Motors plants. Since the UAW-CIO has not petitioned for G.M. elections, it is probable that none will be held. That dominant faction did not expect to get sole collective bargaining for tool and die workers in some 40 G.M. plants during the recent strike, but the results show clearly how the wind blows. With control of labor in Briggs, Chrysler and General Motors, the UAW-CIO high command has ahead of it the job of trying to organize Ford, of settling the bearing plants strikes, and of tackling the truck and spring industries.

The Bendix strike was settled after the UAW-CIO secured a written contract, providing seniority rights and wage increases. The strike caused several days' idleness at Packard and Nash and could have crippled the government's aircraft procurement program. Pressure is reported to have been brought to bear by several automobile companies to settle the strike. In addition, it is said that a Federal conciliator ordered the men to go back to work in the name of the "United States War Dept." He was replaced and Mr. Dewey finished the negotiations leading to a settlement.

Again: Automatic Transmission

Oldsmobile will offer an optional automatic transmission that includes a fluid drive, it is understood. This device is to cost less than $60 extra, and will be made by the Detroit Transmission Div. of General Motors. Gears are said to be placed between the crankshaft and the fluid drive, and between the fluid drive and the propellor shaft. There are two gear speeds forward, and overdrive acts with either one in order to give the effect of second and fourth speeds. After the operator places the car in gear by using the clutch pedal, it is understood that shifting from one speed to another is obtained without the clutch pedal, and that the opera-

Danly "SQUARE"



Precision Sets . . .

Danly Precision Guide Posts are ground and *lapped* to plus or minus .0001" of listed dia. Precision Bushings are ground and honed to plus or minus .0001" of listed dia.

"SQUARE" die sets in sizes from 3"x3" to 14"x14" are included in the new and enlarged Danly line of back post Precision Sets.

In addition to their value for mounting dies that are approximately square, these dies are especially useful for mounting round dies. The additional metal provides a firm seat for dies, in which the set is machined to permit use of bumpers, or to allow stock to drop out of the press.

A new catalog contains full information on the use of these sets and the others in the new and enlarged Danly Precision line. If you have not received one write at once for your copy. All Standard Sets are stocked in 8 Danly Branches for immediate delivery.

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DIE MAKERS— Include Danly Die Sets in Your Estimates

It will be good business for you both

DANLY DIE SETS and DIE MAKERS' SUPPLIES

Their Dependable Quality Means Lower Cost Stampings

tion is automatic. The fluid drive is said to have a slip of not more than 1 per cent. The new transmission was not shown at the press preview and the Detroit transmission division is still taking equipment to make it.

More New Models

Three Chrysler divisions—Plymouth, Dodge and DeSoto—are showing their 1940 lines to the public. The Chrysler six and eights will be announced about the 25th. All lines feature entirely new bodies. Styling approaches Airflow principles by using high massive front fenders. But an important innovation is the fact that the wheels have been moved to the "centers of percussion," in order to achieve a better ride. The rear wheels have been moved back about 7 in. and the front wheels a lesser amount. The result is an increase in wheelbase and a more underslung appearance. Adding to this effect is an out-flaring contour on the rear, so that the previous fast back contour is considerably modified on the lower part. Wheelbases now are: Plymouth, 117 in.; Dodge, 119½ in.; DeSoto, 122½ in. The increase in wheelbase for the Chrysler six and eight is approximately 3 in.

Increasing the wheelbase made it necessary to add an extension to the transmission case, so that approximately the same axle shaft could be retained. Since the point of power take-off is lowered by the extension, the car floor could be built 1–1½ in. lower. The transmission has been rolled over on its side to permit a better shifting linkage.

Buick now covers its price field with six lines of cars. The line consists of four models bearing numerous refinements as compared to 1939 cars but having bodies somewhat similar as to width. These are the Special, Century and the Limited on two wheelbases. The other two lines are the Super 50 and the Roadmaster 70 having the new special body which was termed the "Torpedo" during the development stage, but not known by that name now.

MACHINE TOOL DEALERS PLAN ANNUAL MEETING IN CLEVELAND

CLEVELAND—The annual convention of the Associated Machine Tool Dealers of America will be held in Cleveland, Ohio, Oct. 5 at the Hotel Cleveland. Banquet originally scheduled for Monday, Oct. 9, has been dispensed with because of cancellation of the Machine Tool Show.

Addressing the members at the convention will be A. G. Bryant, president of the association, and James R. Weaver, president American Society of Tool Engineers, who will discuss machine tool problems. The following two days members of the dealers association may attend sessions of the American Society of Tool Engineers semi-annual meeting and participate in the plant visitations arranged by that organization.

GEAR MAKERS WILL DISCUSS MANUFACTURING DEVELOPMENTS

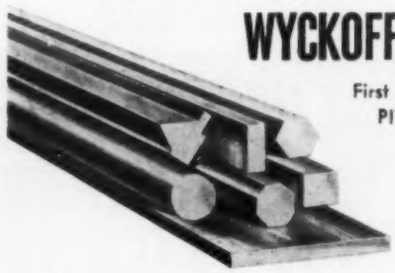
WILKINSBURG, Pa. — Production problems arising from improvements in design of gears and their related mechanisms will highlight the semi-annual meeting of the American Gear Manufacturers Association to be held at Whitcomb Sulphur Springs, St. Joseph, Mich., Oct. 16-18.

High spots in the program will include a discussion of inspection and inspection tolerances by Granger Davenport, Gould & Eberhardt Co.; a review of trends in nickel steel and cast iron materials by C. M. Schwitter, International Nickel Corp.; an explanation of why cost determination need not be a mystery by Paul Christensen, Cincinnati Gear Co. Also featured will be a discussion of gear grinding by John Dixon, Pratt & Whitney; a review of the gear manufacturing industry by U. Seth Eberhardt, Newark Gear Cutting Machine Co.; an explanation of Superfinishing by Chrysler Corp.; an analysis of noise by Prof. F. A. Firestone, University of Michigan.

At the association's dinner S. Wells Utley, president Detroit Steel Casting Co., will discuss the industry's contributions to civilization.

—TO INSURE MAXIMUM ENDURANCE AND WEARABILITY OF YOUR STEEL PARTS IN EVERY DAY SERVICE

Backed by complete plant and metallurgical facilities, Wyckoff offers you a "tailor-made" cold drawn steel service that fits your particular parts production like a glove. No matter what quality or combination of properties you require in cold drawn steel, Wyckoff can serve you superlatively well through well stocked warehouses and conveniently located distributors in every important industrial center.



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3200 So. Kedzie Avenue CHICAGO, ILL.

Mills at Ambridge, Pa. and Chicago, Ill. . . . Warehouse Stocks in Principal Cities . . . Manufacturers of Carbon and Alloy Steels . . . Leaded Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12" x 2"

LARGE ATTENDANCE EXPECTED AT STEEL ENGINEERS MEETING

PITTSBURGH — Over 5,000 steel mill executives and operating engineers from every steel center in the nation are expected to attend the 35th Annual Convention and Iron and Steel Exposition of the Association of Iron & Steel Engineers, which will be held in the William Penn Hotel, Pittsburgh, Pa., Sept. 26-29. Leading authorities on steel plant design and operation will present a broadened and amplified program consisting of 25 technical papers. Program has been planned so that virtually every phase of the production of steel will be covered in considerable detail.

The Iron and Steel Exposition, a feature of the Convention, will include exhibits of the latest designs and products of over 100 manufacturers of steel mill equipment. Inspection trips to two large steel plants in the Pittsburgh area have also been arranged. First trip, on Wednesday, Sept. 27, will be to the new Irvin works of the Carnegie-Illinois Steel Corp., located at Dravesburg, Pa., where the 80-in. hot and cold strip mills will be viewed by the engineers. On Friday the Edgar Thomson works of the Carnegie-Illinois Steel Corp., Braddock, Pa., will be visited.

B. F. Fairless, president United States Steel Corp., will be the principal speaker at the formal banquet and dance to be held on Thursday evening in the William Penn Hotel.

TOOL ENGINEERS WILL MEET DESPITE SHOW CANCELLATION

CLEVELAND—Despite cancellation of the Machine Tool Show and Congress, the American Society of Tool Engineers will hold its semi-annual meeting here Friday and Saturday, Oct. 6 and 7. Program has been rearranged to include a plant visit Friday and another plant visit and the semi-annual dinner and meeting Saturday. Same speakers as originally scheduled will be featured.

BRITISH STEEL MILL OUTPUT AT NEAR CAPACITY FIGURE

WASHINGTON—Steel production in the United Kingdom for July, latest month for which figures are available, reached 1,153,100 tons, according to a report made public by the Department of Commerce. This marks the highest figure ever recorded for any July, and represents a decrease of only 22,500 tons from June as compared with the usual seasonal drop of 100,000 tons.

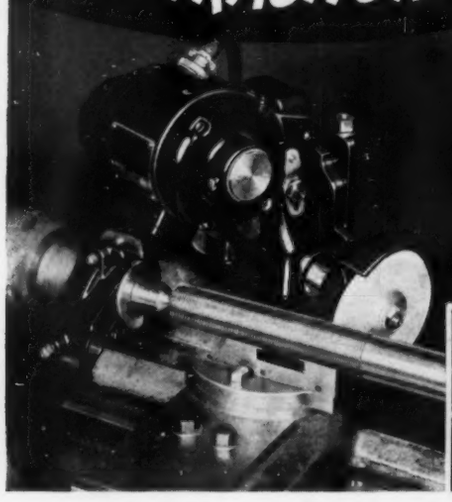
With a calculated yearly capacity of some 14,700,000 tons, Britain's steel industry is now operating at about 95 per cent of capacity, approximately 14,000,000 tons annually.

ARGENTINE EASES RESTRICTIONS ON IMPORTS OF U. S. PRODUCTS

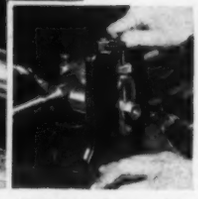
WASHINGTON—A circular issued by the Argentine Exchange Control Office announces relaxing of exchange restrictions applying to imports from the United States, according to information received by the Department of Commerce.

On Aug. 21 the Exchange Control Office had greatly restricted the number and amount of products from the United States for which prior exchange permits would be granted. Of the 173 classes of merchandise whose importation was thus suspended for the remainder of the year, permits are now being granted for the importation of 62 classes in unlimited amounts at an exchange rate equivalent to twenty pesos to the pound sterling. Included in these products are fuels and lubricants, iron and steel pipe, steel wire and steel cable (except barbed wire), copper wire and cable, nails, nuts, screws, high-carbon steel in bars and plates, tin plate, and ball bearings.

NOW.. GRIND THREADS at a FRACTION of Former Cost



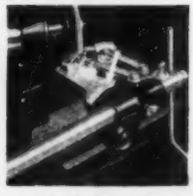
New ATTACHMENT For DUMORE No. 5 Precision Grinder Revolutionizes Thread Grinding



Replace regular mounting post with special one.

Set up grinder by easy-to-follow instructions.

Clamp the wheel dressing attachment to lathe.



Dress wheel and you are ready to grind threads.

Quickly, easily convert one of your lathes into a precision machine for grinding threads. An amazing new attachment for a Dumore No. 5 Grinder does the trick . . . costs but a small fraction of the usual investment for special thread grinding machines . . . requires no installation expense . . . no extra power . . . ties up no large amount of capital. Can be set up and operated by anyone who can chase a thread. Ask your Dumore distributor for complete information and an actual demonstration in your plant. No obligation.

EASY TO SET UP AND OPERATE

A few simple rules to follow and the Dumore attachment converts a lathe and your Dumore No. 5 Grinder into a thread grinding machine.

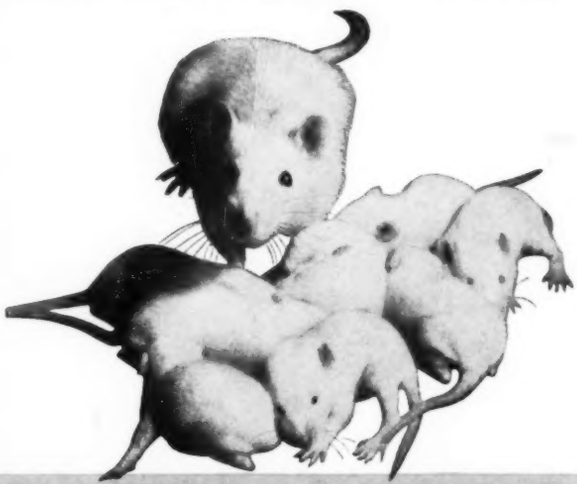
THE DUMORE CO., Dept. 139J, RACINE, WIS.

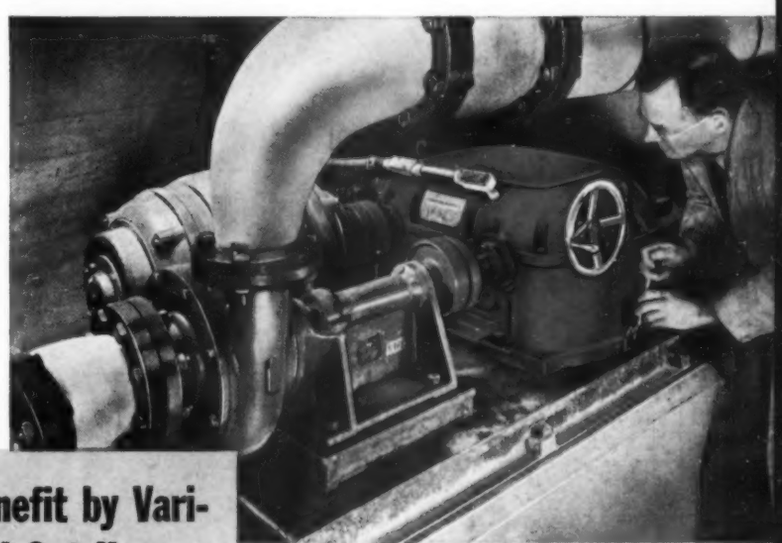
DUMORE

PRECISION GRINDERS

STORY OF THE VARI-PITCH SPEED CHANGER AND THE PAMPERED RATS!

Another true case history from the Allis-Chalmers files that proves **"IT PAYS TO BUY THE EQUIPMENT THAT PAYS FOR ITSELF!"**





Abbott's Rats and Abbott's Operations Benefit by Vari-Pitch's Smooth . . . Accurate Control! Find Out How an A-C Vari-Pitch Speed Changer Can Make Your Machines More Flexible . . . Make Your Production Costs Lower!

ABBOTT'S RATS GET BENEFITS of this Allis-Chalmers combination! The Vari-Pitch hooked to a Lo-Maintenance Motor and A-C pump automatically increases or decreases water pressure by controlling the rpm of the pump . . . makes possible exact control of temperature and humidity.

No mother could give her children more care than Abbott Laboratories gives its white rats. No animal could have more attention. For on them Abbott tests its vitamins, serums, and drugs . . . finds out precisely their potency and safety for humans.

And when Abbott found that varying pressures in the water supply made difficult exact control of their air conditioning system . . . caused changing temperatures and humidity that actually interfered with the rats' normal appetites — they moved quick to do something about it!

They called in an Allis-Chalmers engineer from the Allis-Chalmers Chicago District Office . . . told him their problem. He rolled up his sleeves and went to work.

He hooked a Vari-Pitch Speed Changer to an Allis-Chalmers pump and motor. And because he gave them constant, positive speed control with a Vari-Pitch . . . without springs to get out of order . . . without trial or error guesswork . . . that meant the problem was licked!

For the Vari-Pitch, by accurately controlling the rpm of the pump, increases or decreases the pump pressure to the exact amount needed . . . gives Abbott the water control so necessary in their operations.

This might be an unusual application of an Allis-Chalmers Vari-Pitch Speed Changer. But the performance record it's setting for Abbott is not an unusual occurence. For Vari-Pitch is fast becoming first choice in plants in every industry that want space saving design . . . amazingly high efficiency . . . easy, instantaneous speed changes.

Be sure you know what it means to have a variable speed transmission that operates easily . . . economically . . . without the need for costly multi-speed motors or separate changeovers. For the whole story on the way Vari-Pitch can help you . . . in your plant . . . send for Bulletin B-6013.

Vari-Pitch Speed Changers • Texrope V-Belts • Duro-Brace Texsteel Sheaves • Vari-Pitch Sheaves • Standard Cast Iron Sheaves • Adjustable Pitch Diameter Texsteel Sheaves • 2-3-4 Combination Sheaves • Straitline Automatic Motor Bases • Oil Field Drilling Rigs

A-1135 Belts by Goodrich

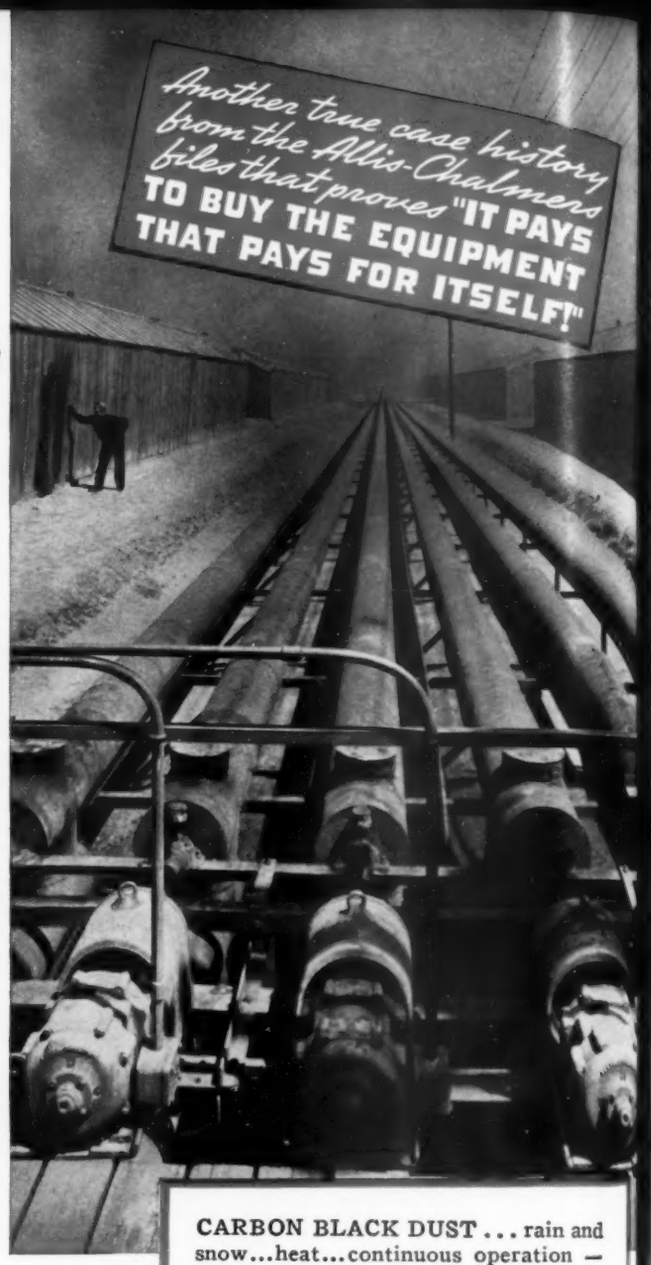
TEXROPE DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

"ALLEYS OF BLACK HELL"

WHERE ONLY THE FITTEST SURVIVE!



Allis-Chalmers Lo-Maintenance Motors Win Place as Standard Motor Equipment in the "Alleys of Black Hell" of Carbon Black Industry! Learn How Lo-Maintenance Motors Can Serve You . . . In Your Industry . . . Under the Toughest Conditions!

"Alleyways" they call them in the carbon black industry—outdoor passage-ways where carbon black is pulverized and handled under the worst possible motor conditions!

Picture it—the air thick with carbon black dust, so fine it passes through a 300-mesh screen . . . snow and rain beating down in the winter . . . great southwest dust storms bringing suffocating dust in the spring and summer . . . and the air temperature in the alleys often soaring to as high as 180° F.!

Add to this — operation that requires 24-hour-a-day motor service . . . 7 days a week . . . with the motor running one way for 8 to 10 minutes, then instantly reversing itself!

Industry Switching to Allis-Chalmers!

Truly "Alleys of Black Hell" . . . with motor conditions so tough that the whole industry is switching to the motor that has proved it can stand up under this punishment! And that motor is the Allis-Chalmers totally-enclosed Lo-Maintenance Motor!

Why is the carbon black industry switching to Allis-Chalmers Motors? Why are hundreds of other industries coming to Allis-Chalmers for the answer to their toughest motor problems?

Get Lo-Maintenance Facts!

It's because of the Full Measure construction that's a part of every Allis-Chalmers motor . . . the extra margin of protection and performance that gives you more than just a rated horsepower! For when you buy a Lo-Maintenance Motor, you get a motor that has built into it the results of Allis-Chalmers 90 years of progressing with industry . . . of engineering motors to drive their own line of heavy duty industrial equipment!

And combined with that are extra-value features of construction—high carbon steel frame . . . indestructible rotor and distortionless stator . . . no skimping on materials! All these work for you—help beat time-wasting shutdowns...reduce maintenance costs . . . give you years of continuous, trouble-free motor service!

CARBON BLACK DUST . . . rain and snow...heat...continuous operation — all unite to make conditions tough for motors in the "alleys of black hell" of the carbon black industry! That's why carbon black manufacturers today use more than 2,000 Allis-Chalmers totally-enclosed Lo-Maintenance Motors!

Learn how Lo-Maintenance Motors can save you money . . . give you better performance! Call the district office near you. Or write to Allis-Chalmers direct. A trained motor engineer will be glad to go over your motor problems with you.

MOTORS FOR ALL APPLICATIONS FROM ½ HORSEPOWER AND UP

ELECTRICAL DIVISION

ALLIS-CHALMERS

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SEE HOW AND WHY THESE IMPORTANT BUILDERS OF MACHINE TOOLS MAKE USE OF MEEHANITE CASTINGS

1. CINCINNATI MILLING MACHINE CO.
   CINCINNATI GRINDERS, INC.
2. A. P. SCHRANER & CO.
3. CINCINNATI SHAPER CO.
4. MONARCH MACHINE TOOL CO.
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8. CARLTON MACHINE TOOL CO.
9. CINCINNATI BICKFORD TOOL CO.
10. FARREL-BIRMINGHAM CO., INC.

This 16-page illustrated booklet will tell you many things about Meehanite. It contains 7 charts of engineering properties—29 interesting photographs. It may help *you* find a way to better *your* product.

MAIL THIS COUPON TODAY!

TO ANY ONE OF THE FOLLOWING MANUFACTURERS OR TO MEEHANITE RESEARCH INSTITUTE OF AMERICA, INC. 441 BOULEVARD, PITTSBURGH, PA.

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A.M. 9-20-39

●BUY FROM THESE LICENSED MANUFACTURERS

Farrel-Birmingham Co., Inc.	Ansonia, Conn.
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Vulcan Foundry Company	Oakland, Calif.
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Florence Pine Foundry & Machine Co. (R. D. Wood Company, Selling Agents)	Philadelphia, Pa.
Warren Foundry & Pipe Corp.	Phillipsburg, N. J.
Rosedale Foundry & Machine Co.	Pittsburgh, Pa.
American Laundry Machinery Co.	Rochester, N. Y.
Banner Iron Works	St. Louis, Mo.
Valley Iron Works	St. Paul, Minn.
The International Meehanite Metal Co., Ltd.	London, Eng.
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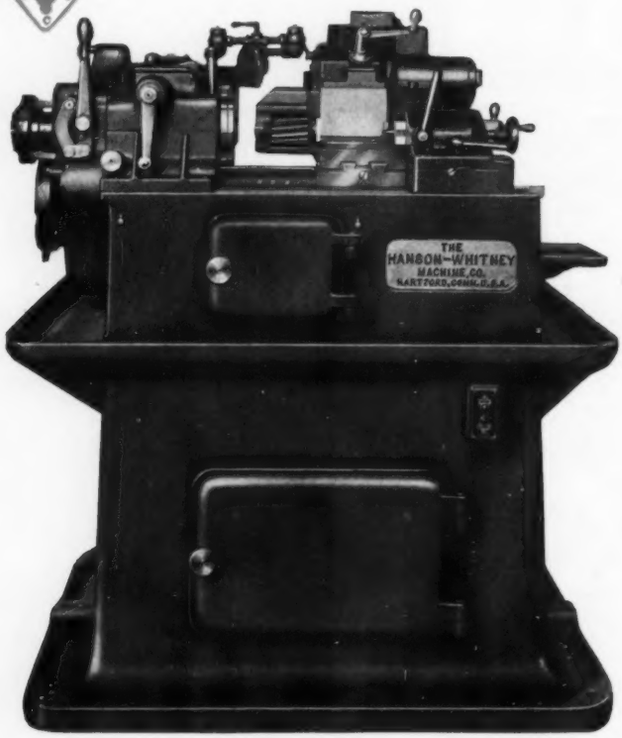
The HANSON-WHITNEY EXHIBIT *of* MODERN



Here's the modern 4 x 9 Hanson-Whitney Thread Miller that will handle the most difficult work quickly and economically. Thread production can be put on a profitable basis with this semi-automatic machine. Hanson-Whitney cut threading costs to the lowest point consistent with high quality.

Size of work:

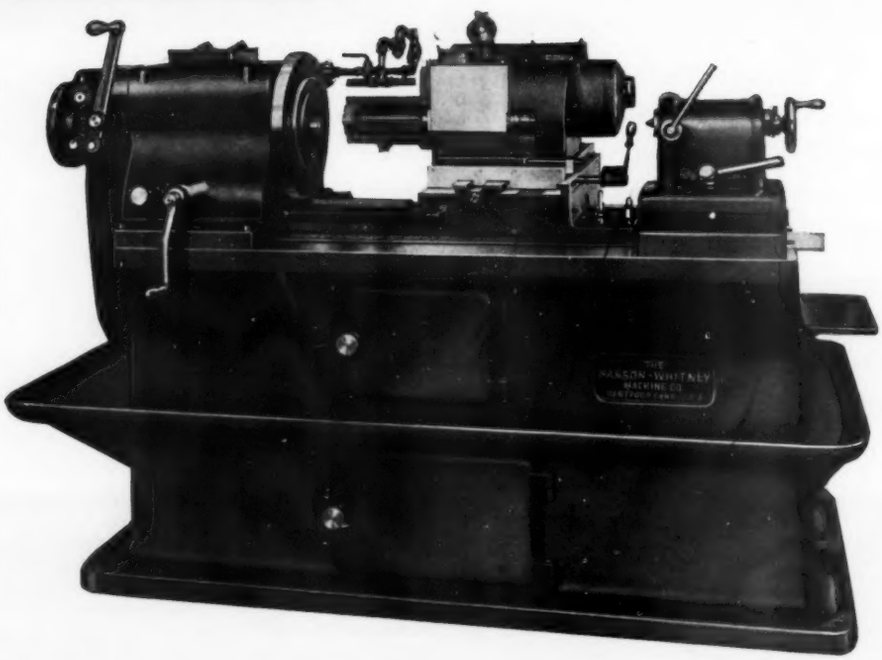
External capacity up to 4" diameter
Internal capacity from ¾" to 4" diameter
Distance thread can be cut from collet 9"

The 10 x 24 Hanson-Whitney Thread Miller will handle the larger jobs. It is also recognized by production men everywhere for efficiency and economy as well as fast, accurate work. The features of the 4 x 9 Thread Miller are incorporated in this larger machine. Either machine will give you better threads at lower cost.

Size of Work:

External capacity up to 10" diameter.
Internal capacity 1" to 10" diameter.

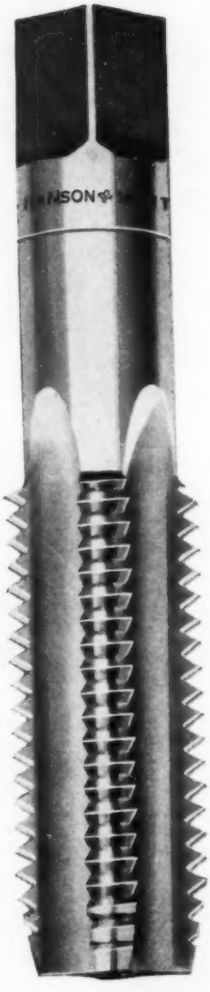
Distance thread can be cut from collet 24"



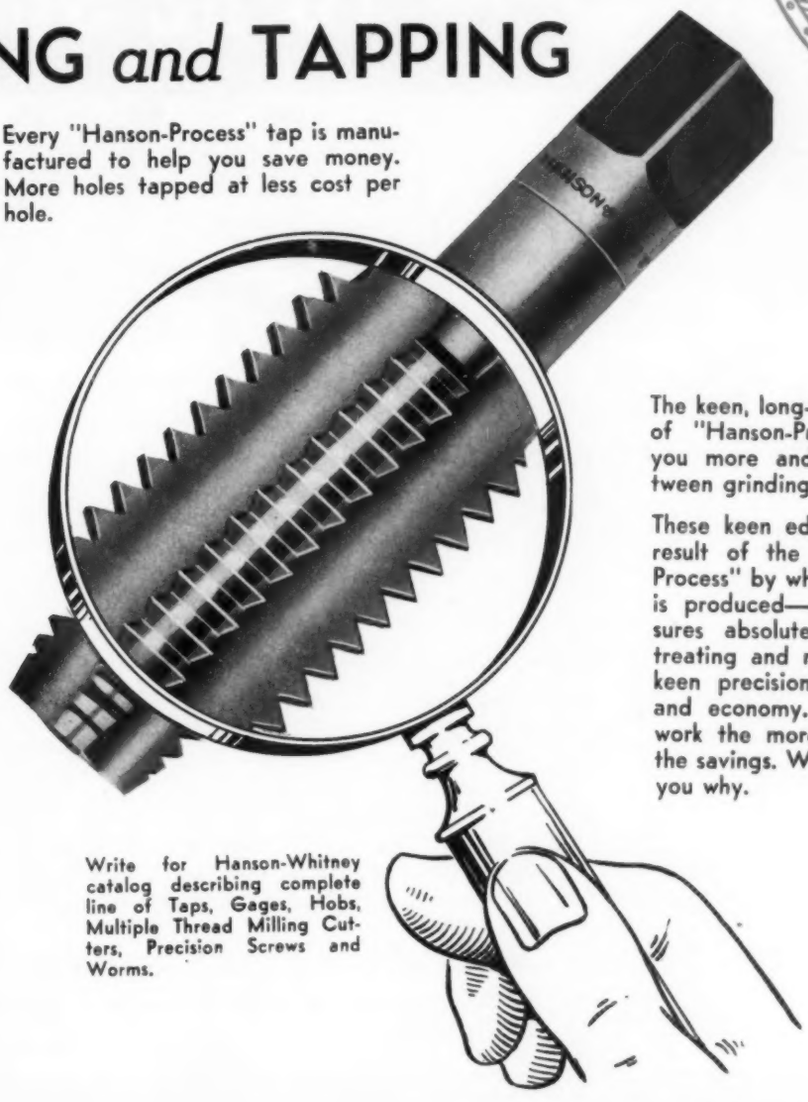
H A N S O N –

IN PICTURES

THREADING *and* TAPPING



Every "Hanson-Process" tap is manufactured to help you save money. More holes tapped at less cost per hole.



The keen, long-lived cutting edges of "Hanson-Process" Taps give you more and better holes between grindings.

These keen edges are the direct result of the exclusive "Hanson Process" by which the finished tap is produced—a process that insures absolute control of heat-treating and results in durability, keen precision cutting, long life and economy. The tougher the work the more apparent will be the savings. We'll be glad to show you why.

Write for Hanson-Whitney catalog describing complete line of Taps, Gages, Hobs, Multiple Thread Milling Cutters, Precision Screws and Worms.

THE HANSON-WHITNEY MACHINE CO.
HARTFORD **CONNECTICUT**

DOMESTIC REPRESENTATIVES

MACHINERY and SMALL TOOLS—New York, L. C. Biglow & Co., Inc.; Rochester, A. G. Brice; Pittsburgh, William K. Stamets; Detroit, Berry Thomas; Houston, Wessendorff, Nelms & Co.; Los Angeles, A. C. Behringer.

MACHINERY ONLY — Philadelphia, Lloyd & Arms, Inc.; Cleveland, William K. Stamets; Chicago, Marshall & Huschart Machinery Co.; Dayton, Seifreat-Elstad Machinery Co.; Cincinnati, Seifreat-Elstad Machinery Co.

SMALL TOOLS ONLY—Philadelphia, General Tool Sales Co.; Cleveland, George A. Whalen; Chicago, M. Ray Pearce; Minneapolis, E. Willard Pennington; Dayton, George Langen, Jr.; Cincinnati, George Langen, Jr.

WHITNEY

Expect TO BE SURPRISED . . .

TAINING . . . . .

SPEED

POWER

Flexibility

By George Z. Griswold

MACHINE DESIGN

Appearance

Gains

TODAY'S BUSINESS

by JOHN W. LOVE

No Matter How Business Looks at Any Time, Fertility of the Arts of Machine Design Is Unimpaired

Newest Machine Tool

Parallel Operations on Automatic Screw Mach

The Cleveland Press

STEEL

EQUIPMENT NEWS

Model 2AA Automatic Screw Machine Can Be Operated at High Speeds

American Machinist

Adds 4-Speed Machine For Sensitive Drilling

Immersion Pyrometer

• More than half a million men in the metal working industry have read about the new CLEVELAND *Single Spindle* AUTOMATIC, Model AA, due to the fact that editors have a nose for news. Before you read this a number of these new machines have been bought, *sight unseen*—each purchase based upon the reputation that was earned by CLEVELAND AUTOMATICS over the past 49 years for rugged dependability—and the amazing versatility, economy and capacity of the Model AA design, revolutionary in so many respects. You *can expect* to be surprised—*all the editors were!*

* * *

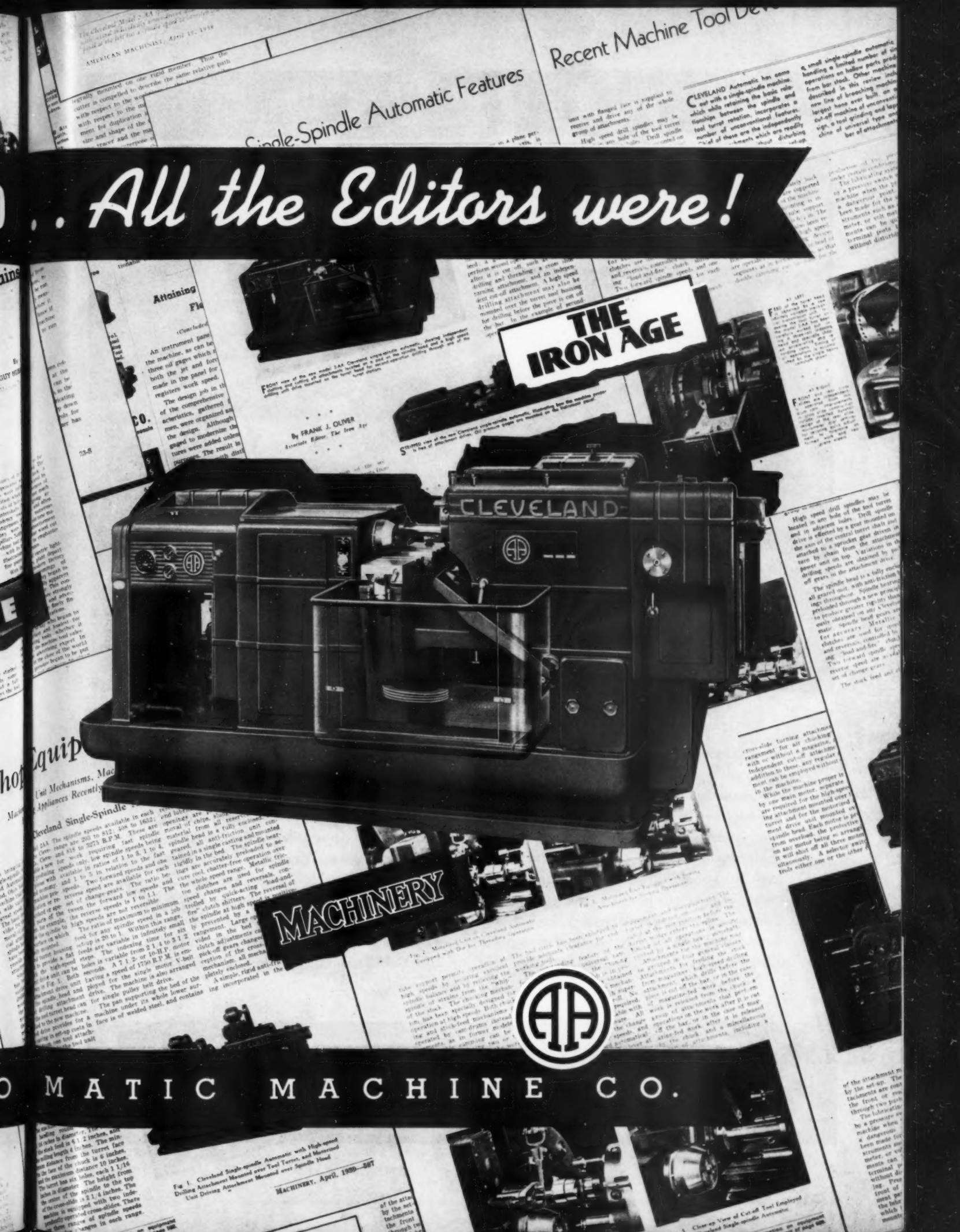
You are invited to inspect the new Cleveland *Single Spindle* AUTOMATIC, Model AA, to have been exhibited at the Machine Tool Show, October 4-13, in Cleveland—at our plant at any time convenient to you from now on. Both $1\frac{1}{16}$th-inch and $2\frac{3}{16}$th-inch sizes will be in operation here on our premises as planned for the Machine Tool Show exhibit.

THE CLEVELAND AUTOMATIC MACHINE CO.

Sales Offices at **New York, 50 Church St.; Detroit, 2842 Grand Blvd.; Chicago, 565 W. Washington St.**

THE CLEVELAND AUTOM

...All the Editors were!



O M A T I C M A C H I N E C O.

FINE SURFACES . . . ACCURATE, PERMANENT DIMENSIONS

Alcoa Aluminum Die Castings

reduce machining costs in the S. S. White Master Dental Unit

Alcoa Aluminum die castings are used in this fine dental unit because they substantially reduce machining costs and, in addition, make a lighter weight unit. Shipping costs are likewise lower because of the weight reduction.

Aluminum needs no expensive plated coatings. The as-cast surfaces are fine as a base for paint, or they can be given many attractive finishes; such as polished, scratchbrushed, ball burnished, which they retain at all reasonable temperatures.

With Aluminum die castings, you get a superior combination of desirable properties: light weight, resistance to corrosion, high heat conductivity, and other excellent physical characteristics. Dimensions are permanent.

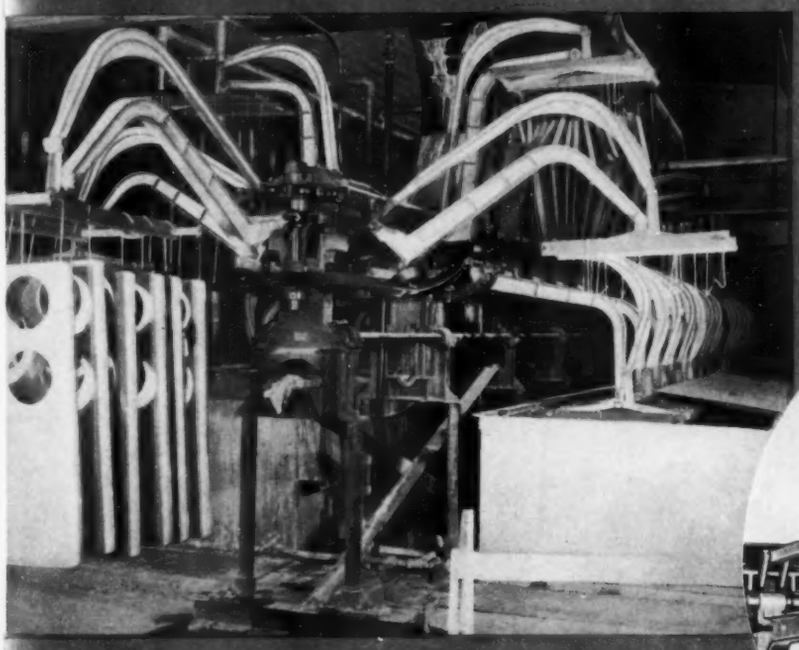
The book, "Alcoa Aluminum and its Alloys," contains considerable data of value to anyone who is considering the adoption of Aluminum. We'll gladly send you a copy. Write to ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh, Pennsylvania.

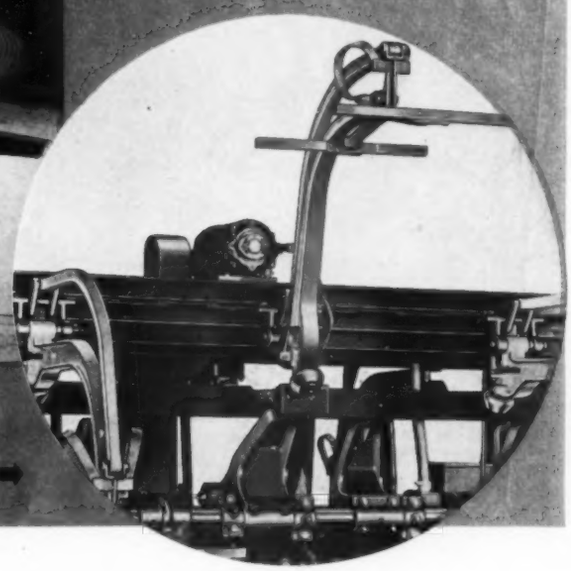
ALCOA ALUMINUM

LIGHT WEIGHT · · CONDUCTIVITY · · RESISTANCE TO CORROSION

Aluminum provides all three advantages..

in Stevens automatic plating machines





Parts are Loaded and Unloaded Here.

Arms in Raised and Lowered Positions.

Built with machine-tool accuracy, a Stevens plating machine times each operation to meet exacting specifications. Into one bath for a definite period, out quickly and into another, and so on through the complete plating cycle: there's little loss of productive time.

Aluminum contributes to the successful performance of these machines. (Built by Frederic B. Stevens, Inc., Detroit, Michigan.)

The carrier arms which support the parts being plated are cast of Aluminum. That's because these arms must be both lightweight and strong; an arm can carry a load of 100 pounds without deflection. Their high electrical conductivity provides a low resistance path for plating currents. Able to resist corrosive attack, these Aluminum arms are not damaged by plating gases.

Alcoa Aluminum Alloys are performing similar services in many places throughout the process industries. Let our engineers help you determine where you may use them to advantage. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

FEEL the SIDES of a V-BELT *as it Bends!*

On Days of High Humidity, Flat Belts on These Presses Stretched Beyond the Take-up Capacity of Spring Idlers. This V-Flat Drive With Gates Vulco Ropes Requires No Idler. It Runs Direct from the Grooved Motor Pulley to the Flat Face of the Press Fly-Wheel. The Gates Vulco Ropes Do Not Stretch in Damp Air and Cause Shutdowns. They Have Exceeded the Best Belt Life With Flat Belts.

PROVE for YOURSELF *this SAVING in BELTS and POWER!!*

THE CONCAVE SIDE IS A GATES PATENT

What Happens When a V-Belt Bends

FIG. 1

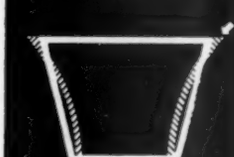


FIG. 2

GRIP with your fingers the sides of *ANY* V-Belt—then bend the belt as it would bend in going around a pulley. You will *feel* the sides of the belt *change shape!* If the sides were *straight* before bending, they become *convex* as the belt bends. (See Figure 1 on the right). Note the out-bulge of the sides.

Now look at Figure 2. This shows the *same* shape-change in a belt with the patented concave side. But what a different result! This belt, when bent, precisely fits the sheave-groove. Two big savings result—(1) There is no side-bulge and this means uniform side-wall wear—*longer life!* (2) There is a full side-width grip on the pulley and this carries heavier loads without slippage—saving the belts and also saving your *power!*

The Gates Vulco-Rope is the only V-Belt built with the patented concave side.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

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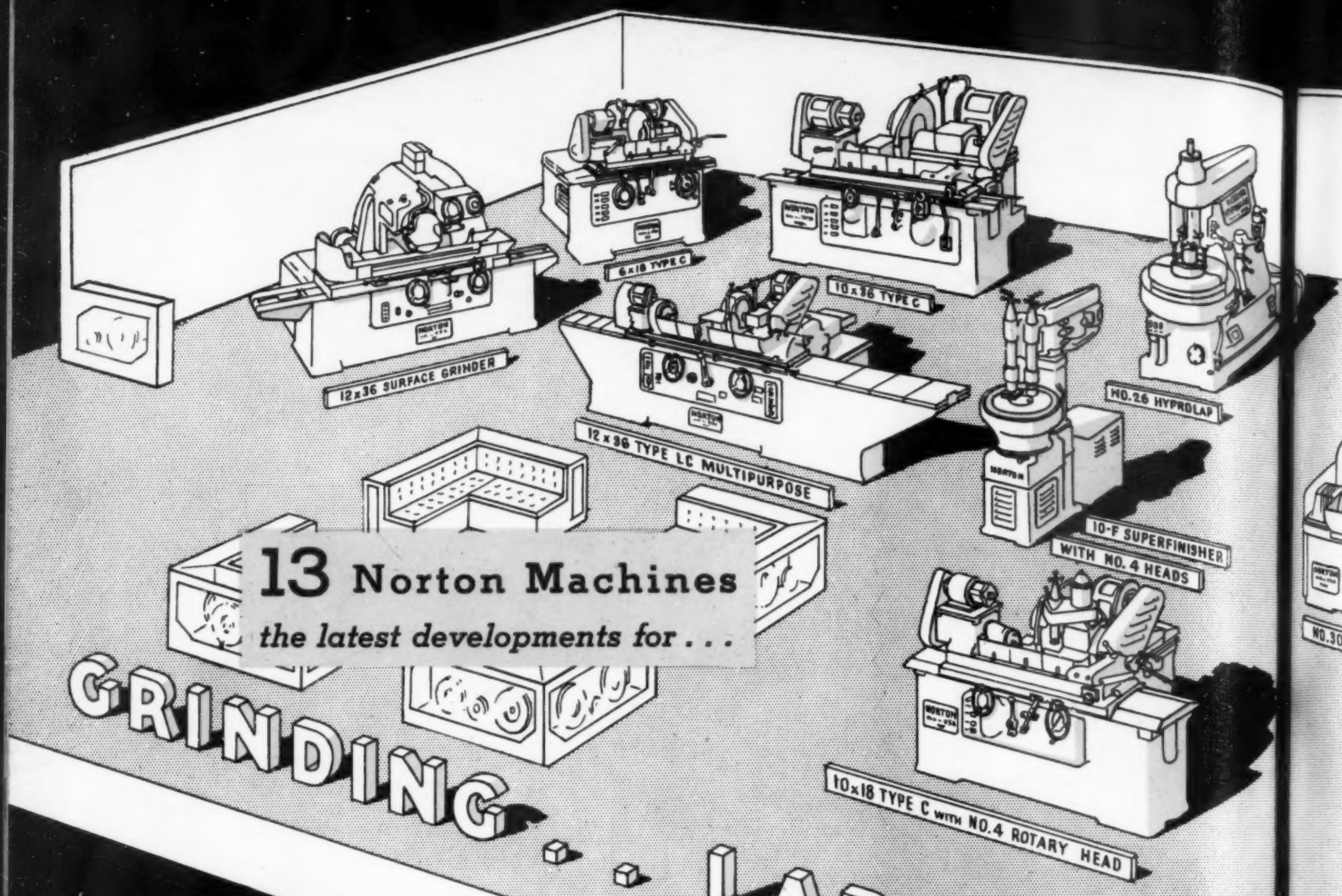
Norton is Featuring....

Kerosene Lubrication of Grinding Machine Wheel Spindles

Lapping for Fine Finish and Dimensional Accuracy

Superfinishing—the New Process for Highly Refined Surfaces

NORTON MACHINES



Norton for Fine Surfaces and High Production Accuracy

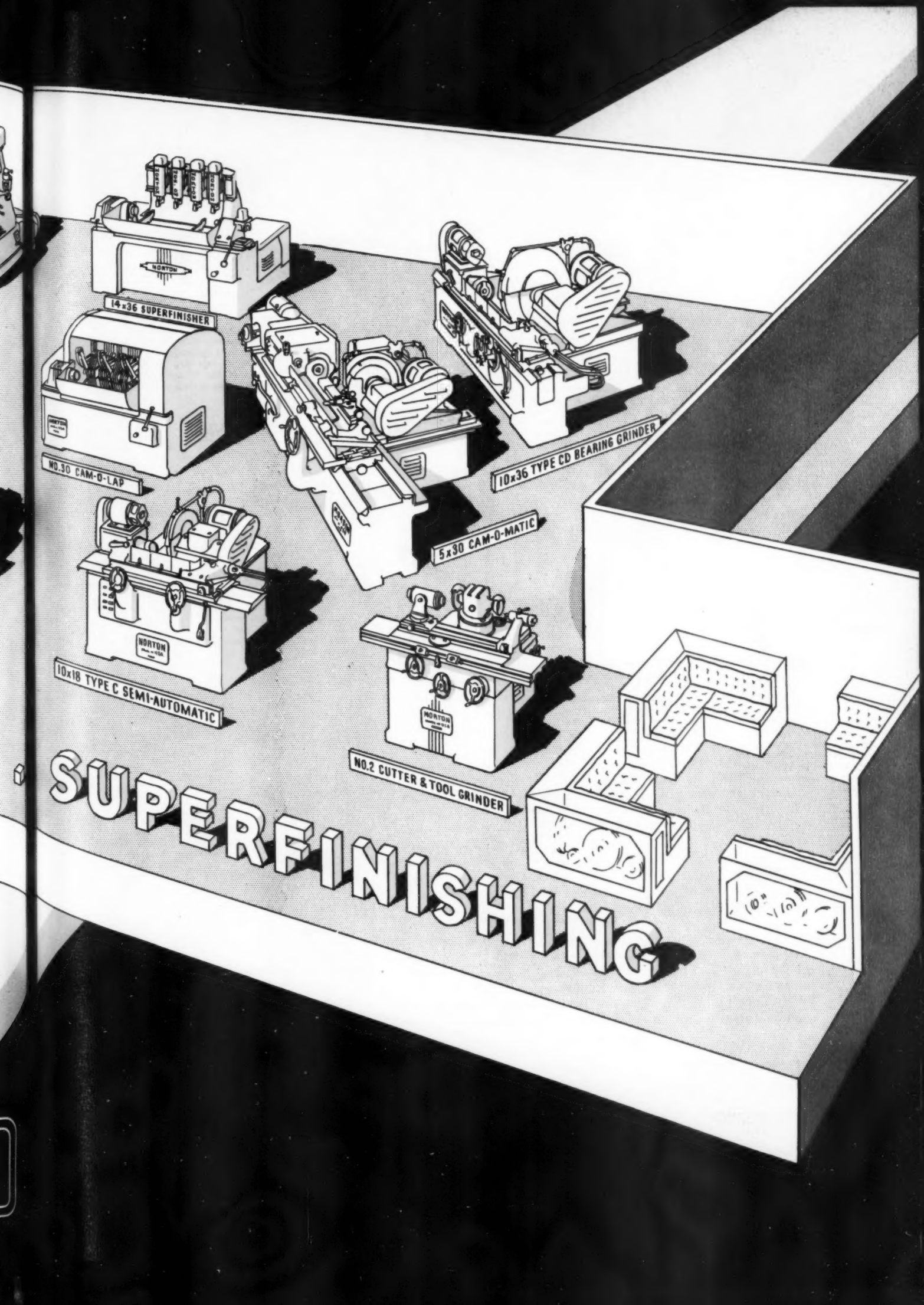
Eight Grinding Machines — (four cylindrical, a crankshaft bearing, a camshaft, a multi-purpose and a surface) with kerosene lubricated wheel spindles — an outstanding advance in grinding machine technology that is increasing production and improving surface finishes. One cylindrical grinder is equipped with an auxiliary superfinishing head so that both grinding and superfinishing can be done in one set-up; a second is equipped for "still wheeling" — another method of producing exceptional surface finishes.

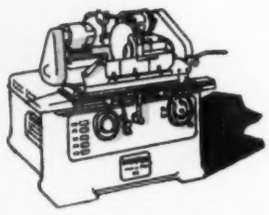
Two Lapping Machines — a new model of the Hyprolap, the machine which has proved so popular for high production lapping and a semi-automatic Cam-O-Lap for lapping cam contours and bearings simultaneously.

Two Superfinishing Machines — one for crankshaft bearings and equipped with four hydraulically operated superfinishing heads and the other for flat work and equipped with two superfinishing heads.

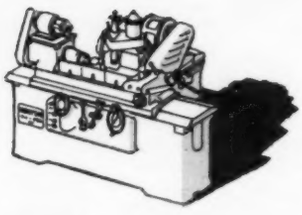
A Cutter and Tool Grinder — an entirely new machine with ball bearing wheel spindle and featuring ease of control and operation.

NORTON MACHINES

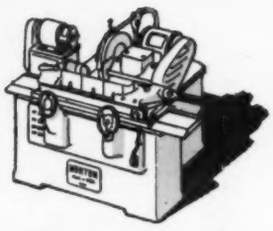

14x36 SUPERFINISHER
NO.30 CAM-O-LAP
10x36 TYPE CD BEARING GRINDER
5x30 CAM-O-MATIC
10x18 TYPE C SEMI-AUTOMATIC
NO.2 CUTTER & TOOL GRINDER
SUPERFINISHING



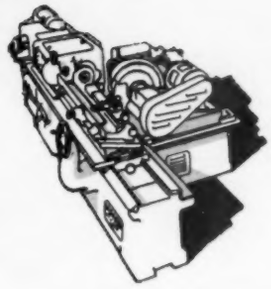
6 x 18″ Type C Cylindrical Grinder — a hydraulically operated machine for traverse cylindrical operations. Has large centers and generous table bearing area. All electrical controls built in and easily accessible.



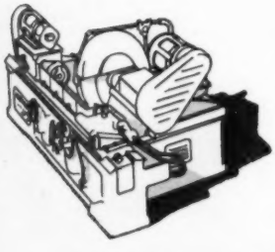
10 x 18″ Type C Cylindrical Grinder for Superfinishing — equipped with a rotary superfinishing head, this standard 10″ cylindrical machine can be used for both grinding and superfinishing in one set-up.



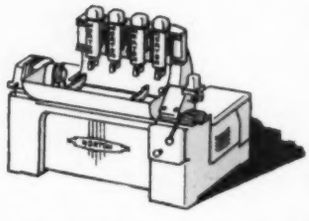
10 x 18″ Type C Semi-Automatic Grinder — a hydraulically operated plunge-cut machine with rigid head and foot-stocks, powerful wheel unit, built-in electrical controls and vertically mounted oil and coolant pumps which run submerged.



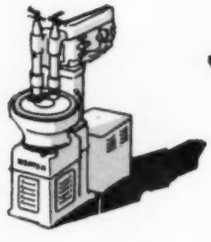
5 x 30″ Cam-O-Matic — a high production automatic cam contour grinder for the automotive industry. Feeding the work into the wheel instead of the wheel into the work is one of its features.



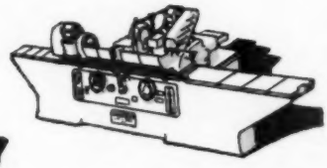
10 x 36″ Type CD Crankshaft Bearing Grinder — developed especially for the automotive industry. A powerful machine with a heavy wheelslide and spindle mounting 42″ wheels.



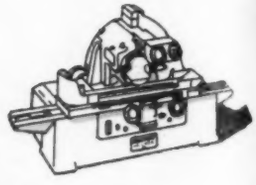
14 x 36″ Superfinisher — a machine for superfinishing all the line bearings of a crankshaft simultaneously. Semi-automatic in operation on an adjustable time cycle.



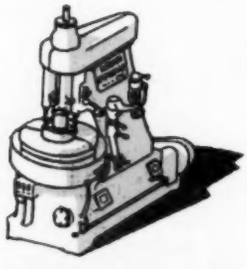
No. 10 F Superfinisher — a machine for flat work equipped with two rotary type superfinishing heads.



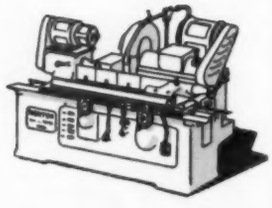
12 x 36″ Type LC Universal—external, internal, face-grinding and tool-sharpening operations can be performed in this interesting, many-purpose machine.



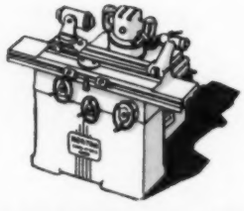
12 x 36″ Surface Grinder — as illustrated it is equipped for semi-automatic surface grinding operations but is available in a variety of arrangements.



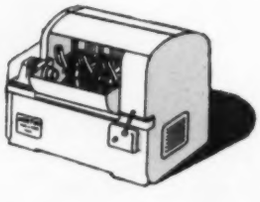
No. 26 Hyprolap — the heavily reinforced column and base provide greater rigidity and faster cutting action in this hydraulic production lapping machine of the vertical spindle type using bonded abrasive laps.



10 x 36″ Type C Cylindrical Grinder — hydraulically operated and with built-in electrical controls. An interesting feature is the "still wheel" arrangement for producing fine finishes.



No. 2 Cutter & Tool Grinder — a universal machine of the wheelslide type. Has ball bearing spindle and easy acting table with adjustable "drag". Operates from front or either side.



No. 30 Cam-O-Lap — all cam profiles and bearings of automotive type camshafts are lapped simultaneously in this automatic machine.

If you are doing any grinding, lapping or superfinishing you'll want to know more about these Norton machines.

NORTON MACHINES

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit London
Hartford Cleveland

Printed in United States of America 9-39

CRUCIBLES "Controlled Hardenability" CARBON TOOL STEELS

HARDNESS PENETRATION

1450°	1550°
6 ALVA	8½ EXTRA
7½ CRESCENT	9 EXTRA SANDERSON
9½ CRESCENT	12 SPECIAL
14 SANDERSON	NO CORE SPECIAL

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Crucible's Carbon Tool Steels

. . . ENABLE "Fitting the Steel" FOR MONEY-SAVING TOOL PERFORMANCE!

Whether you require a shallow, intermediate or deep hardening carbon tool steel—you'll find one steel of Crucible's complete line will do the job best! Crucible—skilled in tool steel production—has perfected melting practise and metallurgical control to a degree where uniform hardness penetration, fracture grain size and maximum machinability of each grade of carbon steel is assured the user . . . lot after lot . . . year after year!

Four ranges of hardness penetration (shallow, medium, medium deep and deep) are offered in these carbon tool steel grades—ALVA EXTRA, SANDERSON AND CRESCENT EXTRA, CRESCENT SPECIAL and SANDERSON SPECIAL—as a glance at the chart (left) will show. Each grade is made in only one hardenability offering ease of selection and eliminating possibility of misapplication.

Illustrated are scores of dies in the toolroom of a Connecticut manufacturer. The requirements for each die were reviewed with our practical men and the type steel "fitted" to the individual requirements. It is interesting that practically all their production demands were answered with Crucible's Carbon Tool Steels.

"Controlled Hardenability" Carbon Tool Steels can offer you savings in increased tool performance and uniform results. Why not call our nearby practical man NOW who will help "fit" the proper tool steel to your requirements. The local member of Crucible's "Coast-to-Coast" warehouses carries extensive stocks for your immediate requirements.

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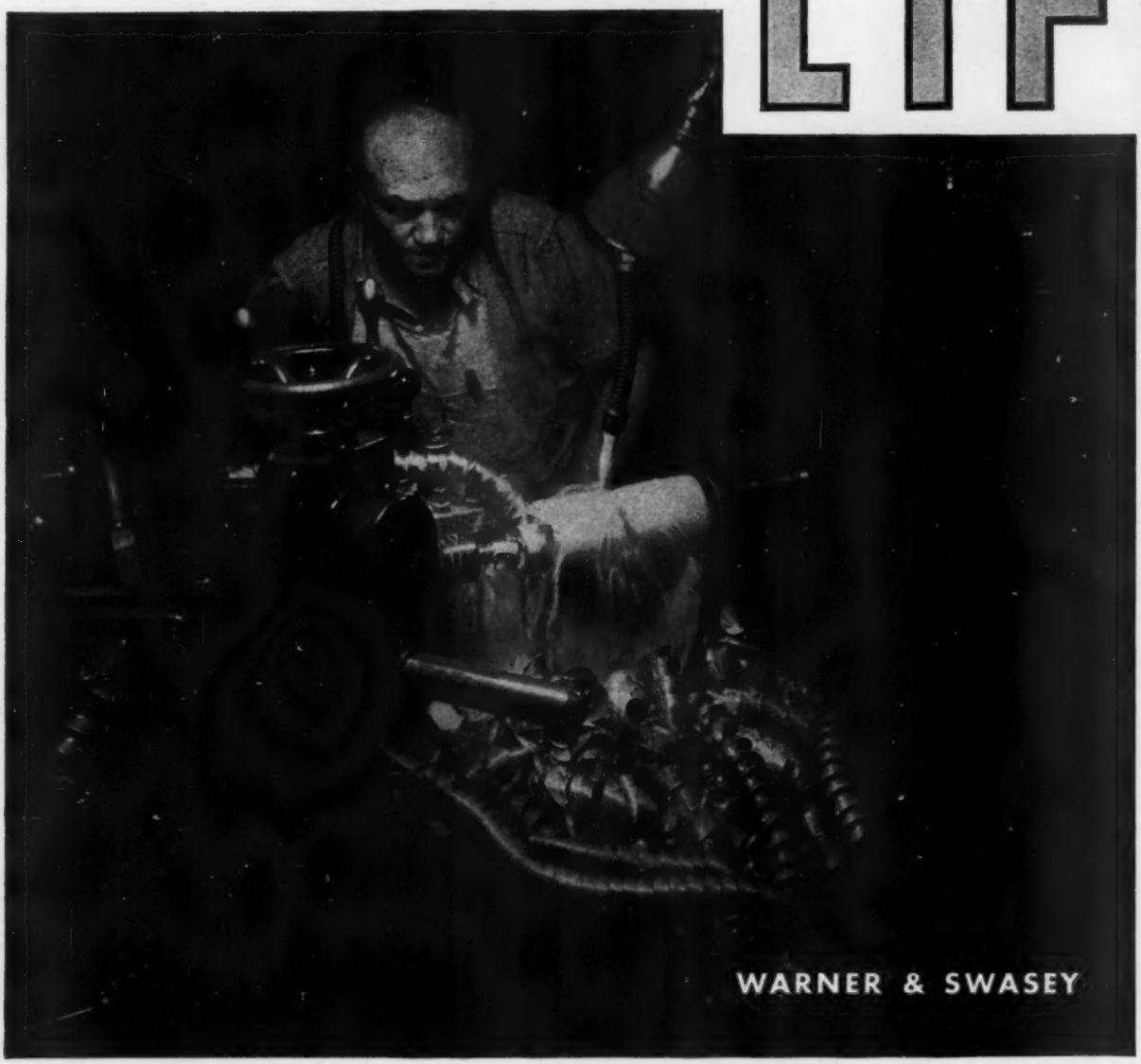

PERFORMANCE PROVES SUNOCO'S VALUE as an aid in establishing new and higher standards of machine tool efficiency. On performance and performance alone SUNOCO has won recognition wherever machine tools are operated.

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CUTTERS HOLD THEIR EDGES LONGER with SUNOCO and mill more pieces per cutter grind — which means lower cost per piece machined.

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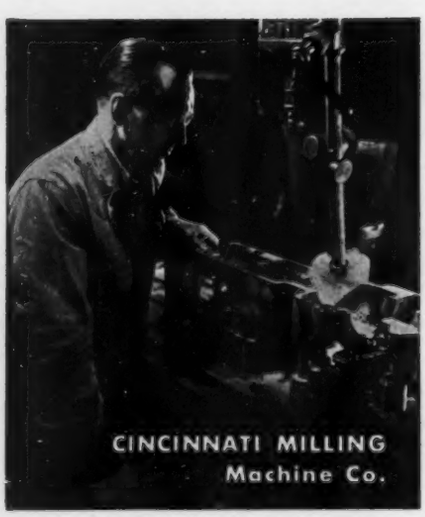
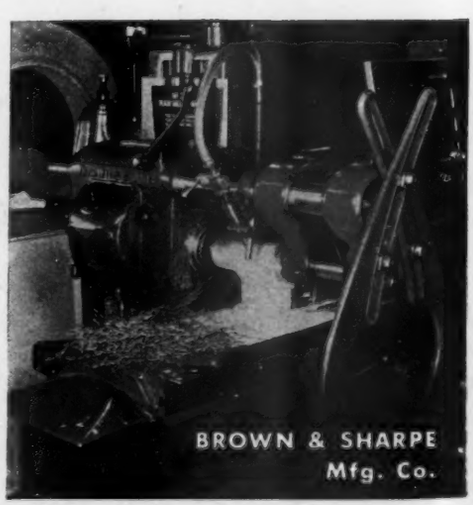
MILLING CUTTERS WILL NOT BURN, chips will not seize and cuts will be clean and even when SUNOCO is used. SUNOCO increases the life of your milling cutters.





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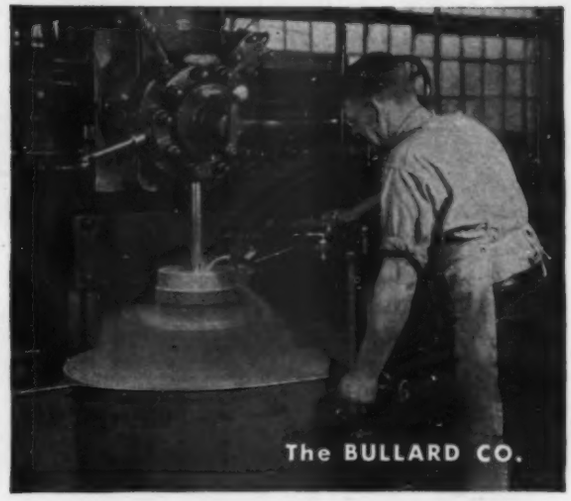
EMULSIFYING CUTTING OIL

Naturally machine tool operators, in their own plants, want their machines to operate at top rated capacity. That's why the outstanding leaders of the machine tool industry have chosen SUNOCO Emulsifying Cutting Oil.

As always, these same leaders are using SUNOCO. They know its high lubricating and heat absorbing qualities make possible increased production . . . more pieces per tool grind . . . and better finishes with less time out for replacing and resetting tools. They know wherever "perfect" production is essential . . . use SUNOCO.

Look through this issue. See the huge strides made by machine tool builders . . . SUNOCO aids metaldom's most modern machines to maintain peak production at all times. . . Call in a SUN Cutting Oil Engineer today and learn how SUNOCO Emulsifying Cutting Oil will aid production in your own plant.

SUN OIL COMPANY, PHILADELPHIA



FAST CHATTERFREE, CLEAN ACTION is assured at the point of the tool when SUNOCO is used. SUNOCO assures heavy cuts at high speeds with long productive runs between tool grinds.

INCREASED TOOL LIFE, CLEAN CUTS, decreased rejects, savings in power and high efficiency in machine tool output may be established with the use of SUNOCO flooded over work and tools.

FASTER STOCK REMOVAL without increasing wheel wear and minimum danger of burning the work is possible with SUNOCO.

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NTH DEGREE ACCURACY, surface perfection and high finish are readily possible with SUNOCO.

To the man who will visit the MACHINE TOOL SHOW

WARTIME BULLETIN

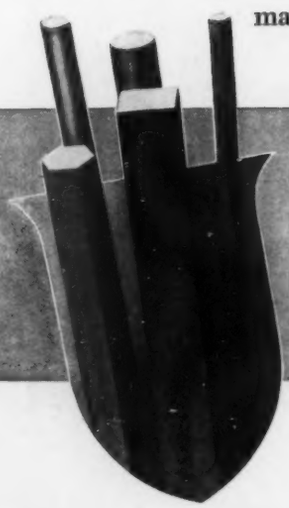
Wartime activity necessitates postponement of Machine Tool Show — makes facts on these pages of even greater importance to you.

At the Machine Tool Show in Cleveland, October 4th to 13th, you will have an opportunity to inspect the newest developments in machine tools. You will see many of these machines in operation, setting new high records of production efficiency. You will be face to face with new possibilities for cutting the cost of producing the parts you make.

If your visit leads to the purchase of new equipment, keep this established fact in mind: The steel you use on these new machine tools will determine to a large degree whether you realize their fullest potentialities for increased efficiency, cost reduction and product improvement.

If, on the other hand, you decide to continue to use your present machines, you will wish more than ever to probe the possibilities for speeding up production, reducing costs and improving the quality of their output. Even though they are running at full capacity and top speeds, you still may be able to gain profitable results by a change of steel or setup.

In either case, remember that Union Cold Drawn Steels are processed to bring greatest production efficiency, highest product quality and lowest parts costs to users of both old and new equipment. Union Drawn Field Service Men, drawing from the practical experience of many years of service to parts producers, are ready to cooperate with you in selecting the most efficient steel and in helping your men to establish the most profitable machining and fabricating practices. Union Drawn Steel Division of Republic Steel Corporation, Massillon, Ohio.



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To the Man WHO CANNOT ATTEND THE MACHINE TOOL SHOW

While you are unable to attend the Machine Tool Show at Cleveland, you undoubtedly are keenly interested in the new developments in machine tools to be shown there. You will read about them in the trade papers and see them illustrated in manufacturers' advertising and literature. You will become acquainted with the possibilities they offer for improving your product and your shop costs.

If, as a result, you decide to install some of this new equipment, keep in mind that while new machines are designed to operate more efficiently, the final result will be dependent to a large extent upon the steel you use.

If, on the other hand, you continue on with your present equipment, the problem of turning out fine quality parts at fullest machine capacity and minimum cost becomes an important consideration. Here, again, the steel you use is a vital factor in determining speeds, feeds, production efficiency and unit cost per piece.

For years, Union Drawn has specialized in providing machine tool users with cold finished steels that enable them to produce better steel parts faster and at lowest possible cost. Union Drawn Field Service Men — old hands at licking steel selection and fabricating problems — will be glad to cooperate with you in picking the right steel and developing your machining practice to get the most out of equipment of any type or age. Union Drawn Steel Division of Republic Steel Corporation, Massillon, Ohio.

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OPEN HEARTH AND ELECTRIC FURNACE STEELS
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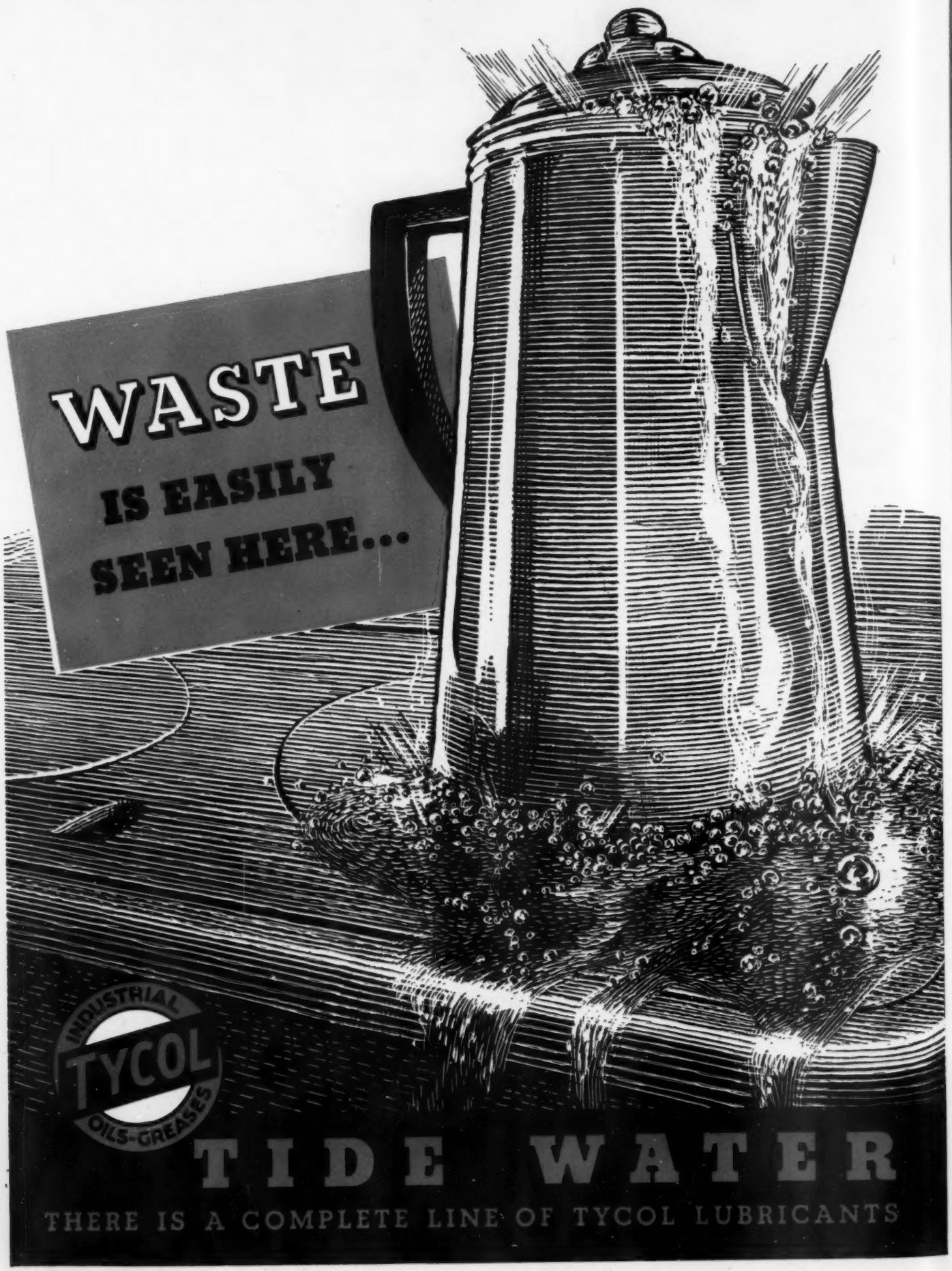
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TYCOL
OILS-GREASES
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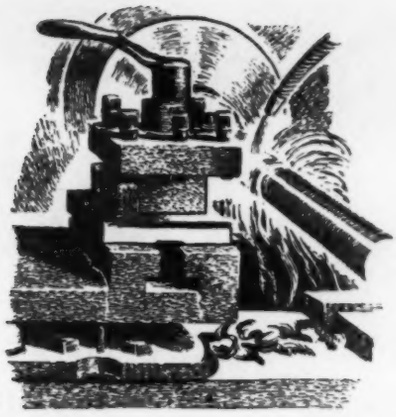
THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS



. . . But a 35% waste in production capacity was hidden here until banished by Tide Water Cutting Oil

"Our best run on threading machine operations was only two hours, with 45 minutes out for sharpening and replacing. We changed to Tide Water Cutting Oil. It revolutionized the entire shop. Now, the machines run 20 hours before any grinding is necessary.

"Units made of hexagonal stock, which are threaded externally, are made at the fast rate of 18 per minute. We now make 21,600 pieces during the 20 hours use before the tool needs sharpening. Only 15,930 were formerly produced in the same time. Tide Water Cutting Oil increased our production slightly over 35%."

Dollar and cent savings like this are typical tributes to the high quality of Tide Water Cutting Oils. They banish tarnishing . . . increase tool life . . . assure finer finishes. Call in a Tide Water engineer. His services are freely offered to help you uncover hidden wastes. He will recommend the lubrication "engineered to fit the job."

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New York, N. Y.

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NON-TARNISHING
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SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE

MEMO

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From: THE SALESMEN WHO HAVE TO SELL YOUR PRODUCTS

Subject: AMPCO METAL

Everywhere we go, we hear about Ampco Metal. Please get the complete facts on why Ampco Metal offers such remarkable values in wear-resistant and shock-proof qualities and why Ampco Metal is the usual choice of machine tool builders for extreme service parts—gears, bushings, bearings, etc.—where long-life is demanded.

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HIGH CONDUCTIVITY ALLOYS, AMPCO BERYLLIUM COPPER, SPECIAL COPPER-BASE ALLOYS.

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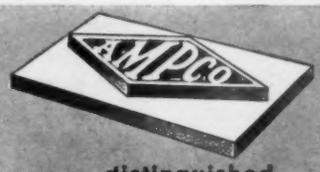

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★PERFORMS WITH 18-4-1

D-B-L is the latest sensation of the tool steel world! Here at last is the culmination of years of research—a *brand-new* steel alloyed with native elements, not subject to foreign embargoes—that will cut right along with 18-4-1 on *your own work*.

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D-B-L is the *first* commercially successful high speed steel that completely meets your demand for a product to match 18-4-1, *at less cost!* D-B-L saves money—improves your competitive position.

★HEAT-TREATS AS SIMPLY

D-B-L can be heat-treated in the same furnaces and under the same atmosphere as 18-4-1. It shows no more decarburization than 18-4-1; no borax or other coating is required. In other words, the use of D-B-L requires *no special precautions*, nor will your men have to experiment with new heat treating techniques.

Let this brand-new tool steel prove itself to you! ● Write for details—*use the coupon below*—let us help you to work out D-B-L's application on *your* jobs.

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Send me descriptive material and test data on your new D-B-L Steel.

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No matter how limited your requirements may be—even if less than 100—your needs can be met quickly, accurately and economically, with lowest possible die cost.

Our die stamping service does not require the usual expenditure in time and money for stamping dies. Stampings in small lots for which costs would ordinarily be prohibitive, can be had by our perfected method at a surprisingly low figure.

Stampings can be made from practically any material in almost any size or shape up to a thickness of ¼". All working tolerances are rigidly adhered to assuring accuracy and uniform duplication throughout the entire lot.

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DAYTON ROGERS MANUFACTURING CO.

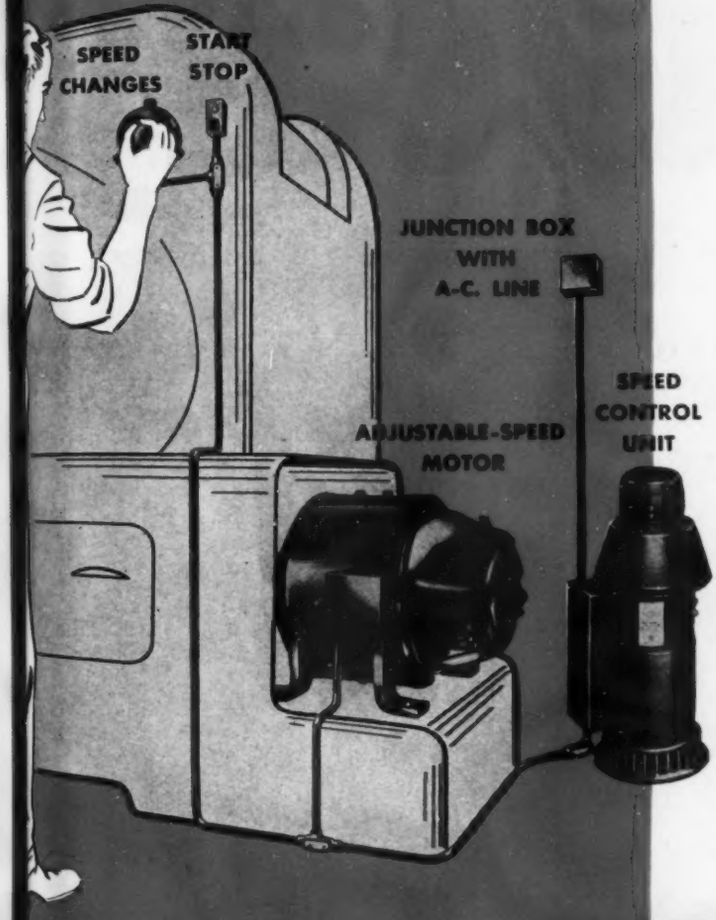
Minneapolis, Minnesota

NEW YORK CITY CLEVELAND CHICAGO

RELIANCE V*S DRIVE

AN ALL-ELECTRIC ADJUSTABLE-SPEED DRIVE FOR ALTERNATING-CURRENT CIRCUITS . . .

Now makes available in economical form for sizes 1 to 15 hp. a proven principle of speed control long used for large units



You can do these things with this new Reliance Drive: (1) Apply power where you want it without intervening speed-changing devices . . . (2) Control speeds at any point to which a wire can be run, and do it from a speed changer no bigger than a pie plate . . . (3) Control starting and stopping from a small push-button station placed within easy reach.

Besides the advantages of wide speed ranges (12 to 1) and remote control you get other important features such as quick stopping, speed setting, safe speeds for threading and inching, ample starting torque for all conditions. All these are made possible at a lower price by the "packaged" V*S Speed Control Unit which is connected by three wires to the 3-phase a-c. power circuit. Of vertical construction, it takes little space and can be mounted anywhere.

Reliance Electric & Engineering Company
1075 IVANHOE ROAD **CLEVELAND, OHIO**

Birmingham, Boston, Buffalo, Chicago, Cincinnati, Detroit, Greenville (S. C.), Los Angeles, New York, Philadelphia, Pittsburgh, Portland (Ore.), St. Louis, San Francisco, Syracuse (N. Y.) and other principal cities.

DESIGNERS . . .
Please take note

is new drive will help in "streamlining" your uipment by giving a direct, positive connection m the adjustable-speed motor to the machine. ed adjuster and push-button take so little space t they can be grouped with other control handles easy operation.

★ ★ ★

oduced by men who have cialized in adjustable-speed tor-drives for 34 years.

★ ★ ★

t Bulletin 307 for details of many desirable character-

A Reliance V*S Drive provides a 4 to 1 range of speeds for the work table of this cylindrical grinding machine . . . The V*S Control Unit placed at the back of the grinder is connected to the shop's 3-phase a-c. power circuit by three wires from the same outlet box as the two a-c. induction motors which are also used on this machine . . . The start-stop Push-button and Speed Adjuster are at the front of the machine alongside other control buttons and handles.

RELIANCE A-C D-C MOTORS

GARGOYLE D.T.E. OIL HELPS

Act Quickly

When you see a hydraulic machine that's maintaining steady low-cost production —chances are that Gargoyle D.T.E. Oil is the fluid medium.

For this oil helps machines get the "free and easy" action that reduces costly rejects and saves power.

Fifty-three of the 54 leading hydraulic machine builders know these facts—specifically recommend Gargoyle D.T.E. Oils for use in their machines!

THE SOCONY-VACUUM man offers you a complete line of lubricants, plus these *exclusives:*

The right lubricant for every machine . . . and new lubricants ahead of new needs . . . developed by world-famous research laboratories through close cooperation with machine builders.

73 years' experience—thousands of case histories—to guide in prescribing the right use of these lubricants to gain Lubrication Profits for you.

World-wide distribution and guaranteed uniformity—the same quality available everywhere.

HYDRAULIC MACHINES

_Smoothly!

SOCONY-VACUUM

Industrial Service and Lubricants Help to Lower Costs by

Correct Lubrication

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO., INC.

Standard Oil of New York Division · White Star Division
Lubrite Division · Chicago Division · White Eagle Division
Wadhams Division · Magnolia Petroleum Company
General Petroleum Corporation of California

2 NEW FACTORIES Modern for Better

ELECTRODES — THAT'S ALL

Devoted exclusively to the manufacture of electrodes, two of the world's most modern electrode factories, now operating in full swing, produce all G-E electrodes. To assure strict uniformity, both plants are completely equipped with the latest streamlined production facilities. To make prompt shipment of all types and sizes without delay, they are located adjacent to steel mills—their principal source of raw material.

APPROVED BY AUTHORITIES

The high quality of these new modern G-E electrodes is evidenced by the fact that their use is permitted on work requiring the approval of Hartford Steam Boiler Inspection & Insurance Co., American Bureau of Shipping, Lloyd's of London, Southwestern Laboratories, and other recognized authorities.

NEW PRODUCTION FACILITIES
Provide new standards of uniformly high-grade electrodes

COMPETENT SUPERVISION
Of all manufacturing operations assures constant uniformity of product

GENERAL ELECTRIC

Now Make G-E Electrodes

Arc Welding

"SHOP-PROVED" BY GENERAL ELECTRIC

As further assurance of their ability to produce profitable results, G-E electrodes also are continually "shop-proved" by a most critical user—G-E shops. Keen competition compels General Electric to use the most efficient production tools obtainable. That's why G-E shops use more than a million pounds of G-E electrodes annually.

NATION-WIDE AVAILABILITY

National distribution service maintains local stocks for immediate delivery—thus minimizing the quantity a user needs to carry on hand to assure adequate supplies. You, too, may find it convenient and profitable to take advantage of this new, reliable source of outstanding electrode values. Call your G-E arc-welding distributor or G-E sales office for further information, a demonstration, samples, or help with your welding problems; or write General Electric, Schenectady, N. Y.

TRAINED RESEARCH STAFF

Continually makes sure that G-E electrodes are representative of the best that modern science can produce

A COMPLETE LINE

of G-E electrodes is available for mild steel, high-tensile steel, cast iron, and other welding work

GENERAL ELECTRIC

Standardize on AMERCUT

. . . *and get* Better Parts *from the* Same Machine

AMERCUT Cold Finished Steel Bars produce parts that are accurate in size and have a smooth, shining finish. The cold drawing operation employed in the manufacture of these bars improves the physical properties of the steel . . . an extra quality factor that is carried into the products you make. The uniform structure in cold finished steel bars which carry the AMERCUT tag assures easy machining, resulting in reduced tool costs and more accurate parts.

When you standardize on AMERCUT Cold Finished Steel Bars you can be sure of getting bars that meet your requirements in every specification.

We are equipped to supply you with any type or grade you need and in the shape or finish you require. Rounds are available from stocks on hand in any size from 1/32" in diameter up to and including 6". Our Sales Department or service engineers will be glad to give you complete information on special sizes and shapes. Send for our catalogue containing important charts, tables, etc.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

DIES GIVE SIX TIMES MORE WORK WITH ACME CUTTING OIL

"Now, all tests of cutting oil are over. We'll use Acme No. 80."

When the Superintendent of an Illinois plant made that statement he *knew* that he had found the right cutting oil for his job. One production problem was threading ¾-inch rod. Formerly, rough threads had made it necessary to change dies frequently, but now with Acme he makes many runs of 8,000 inches before grinding dies—six to seven times more production from each die. Threads have improved to such an extent that many dies which had been discarded when the original oil was used now give perfect satisfaction with Acme.

Let a Standard Lubrication Engineer look over your metal cutting operations. He may find a number of jobs where Acme Cutting Oil can make a worthwhile saving for you. It won't cost you a cent. You can reach one of these Engineers at your local Standard Oil (Indiana) office or by writing 910 S. Michigan Avenue, Chicago, Illinois.

Copr. 1939, Standard Oil Co. (Ind.)

ACME CUTTING OIL

FIRST IN SERVICE
FOR FIFTY YEARS
STANDARD OIL (IND.)

STANDARD OIL COMPANY
(INDIANA)

...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICA

G...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEE

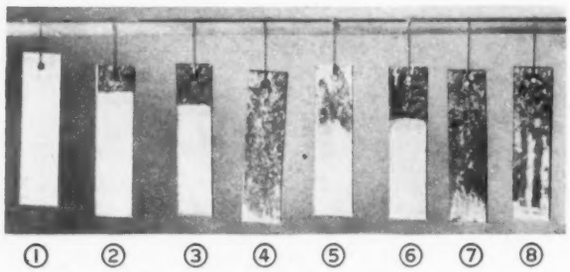
Anti-friction bearing on mounting supporting the main cylinder shaft in a combine. These bearings are lubricated and protected against rusting in storage with Stanorust.

STANORUST

Only after rigid tests under laboratory control was Stanorust given the job of protecting the anti-friction bearings in the harvesters manufactured by a large manufacturer.

When this problem of rust prevention came up, a Standard Lubrication Engineer was asked to give his recommendation. He picked Stanorust because it would give adequate rust protection and supply the necessary lubrication.

Because of the importance of having complete rust protection, the Chief Chemist at the plant decided to test a number of oils. Samples of polished steel plates were coated with various rust preventives and subjected to a mist spray of water for one week. The results of this test are shown in the illustration above. Stanorust gave complete protection even under this severe test where many of the other products failed completely.



Polished steel strips used in testing rust preventives at the customer's plant. No. 1 shows a sample strip before testing. Nos. 2 and 3 were protected with Stanorust and subjected to the test. Note the absence of rusting where Stanorust was applied in contrast to the various degrees of rusting in evidence on the other pieces not protected with Stanorust.

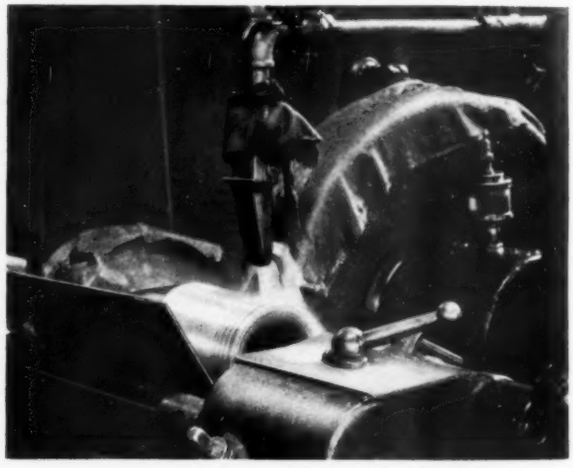
Stanorust is available in several grades. A Standard Lubrication Engineer will help you choose the right grade for your purpose and make a test in your shop. You can reach one of these Engineers at your local Standard Oil (Ind.) office, or by writing 910 S. Michigan Ave., Chicago.

YOU CAN GET THE SAME SERVICE THAT MADE MONEY FOR THESE MEN...

SUPERLA SOLUBLE OIL

Ten per cent longer wheel life and complete freedom from rusting of work! Those are two of the reasons an Indiana manufacturer gives for using Superla Soluble Oil exclusively in his shop for the past ten years.

He has tested many soluble oils in that time. None has met all of the requirements for all types of grinding as completely as Superla. Besides giving better tool life and freedom from rusting, even in lean mixtures, Superla Soluble Oil produces a fine finish. It's economical, too—it takes less oil to form highly efficient emulsions even in the hardest water. Odor troubles caused by rancidity are entirely eliminated in Superla emulsions.



If you have a metal working operation on which a soluble oil can be used, ask for a test of Superla. A Standard Lubrication Engineer will be glad to show you how Superla meets all these requirements.

MAIL THE COUPON FOR LUBRICATION INFORMATION

STANDARD OIL COMPANY (Indiana) SEPTEMBER
910 South Michigan Avenue, Chicago, Illinois. Room 1222

Gentlemen: Please send me the booklets checked:

☐ How to Get More From Cutting Oils.
☐ How to Get More From Emulsifying Oils.

(Available to readers in the Middle West)

Name.....

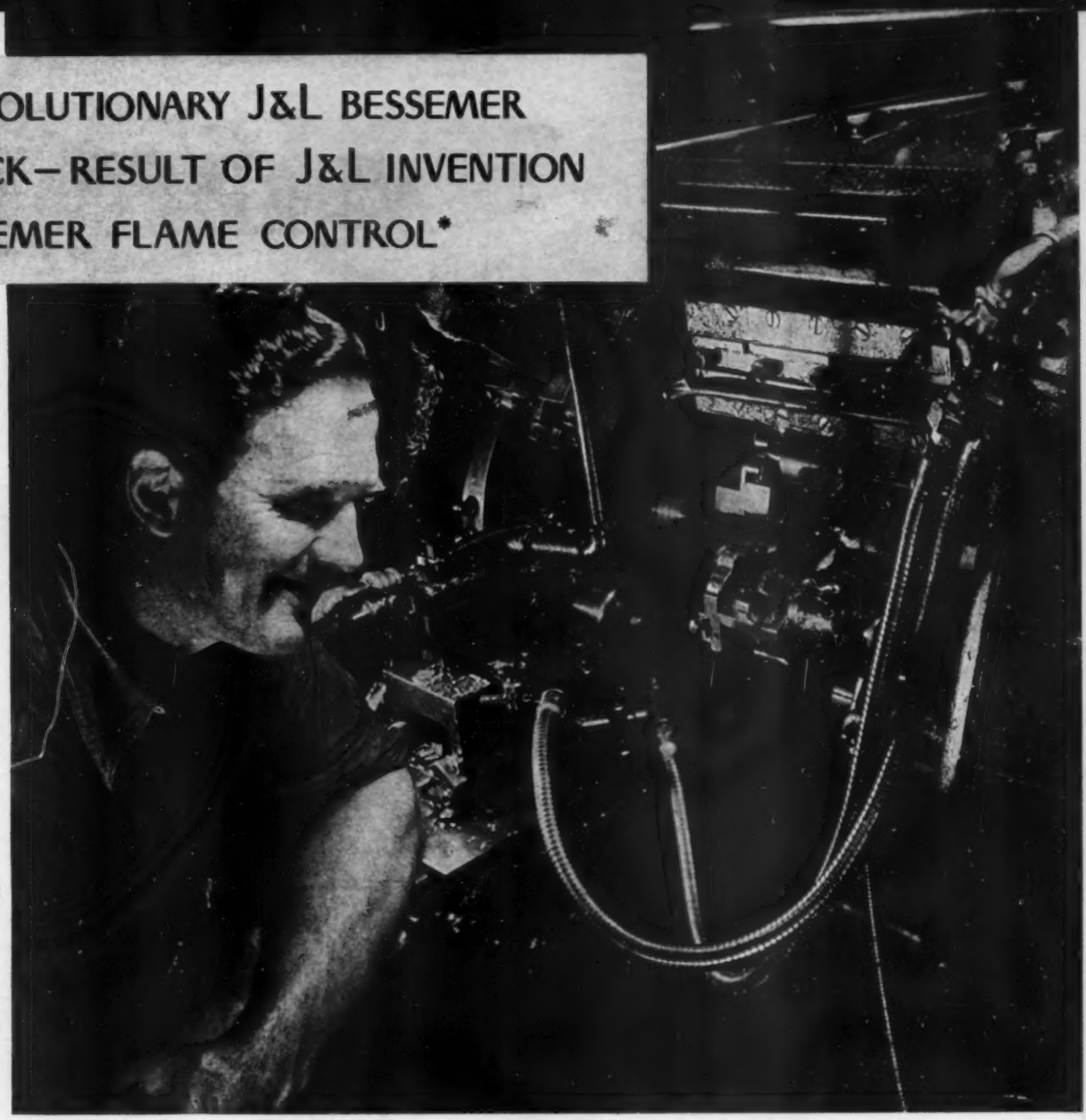
Company.....

Address.....

City..... *State*.....

● IF YOU USE cutting oils or soluble oils, you'll want these two NEW booklets. They tell what qualities to look for in these oils and describe how they affect tool life, finish, and production on various metal cutting and grinding operations. If your plant is located in one of the 13 states shown above, these booklets will be sent to you without any obligation. Just send the coupon.

NEW, REVOLUTIONARY J&L BESSEMER SCREW STOCK—RESULT OF J&L INVENTION —BESSEMER FLAME CONTROL*



LISTENING—that's part of the screw-machine operator's job. By his skill he knows the steady, high-pitched hum of the automatics that means thrifty production. And he knows, too, that to hold this production rate, hour upon hour, all the stock he feeds into the machines—bar after bar—ton after ton—must be precisely uniform in quality. Such is the way with the new J & L Bessemer Flame Control cold finished screw stock.

The precise uniformity of the new J & L steel is not a vision of human fancy. It is a fact based upon results obtained through months of practical operation of the new J & L Bessemer Flame Control process—a development that brings in a new era of steel-making—producing steels that process easier and more economically for you. Ask a J & L representative to give you more information about this Bessemer Flame Controlled cold finished screw stock. And remember, there is no extra charge for this new and revolutionary steel.

* *Bessemer Flame Control, with an arrangement of photo-electric cells and other precision instruments, provides an instantaneous record of the rapid changes in the Bessemer flame. It is one of several methods on which patent applications have been filed by Jones & Laughlin Steel Corporation.*

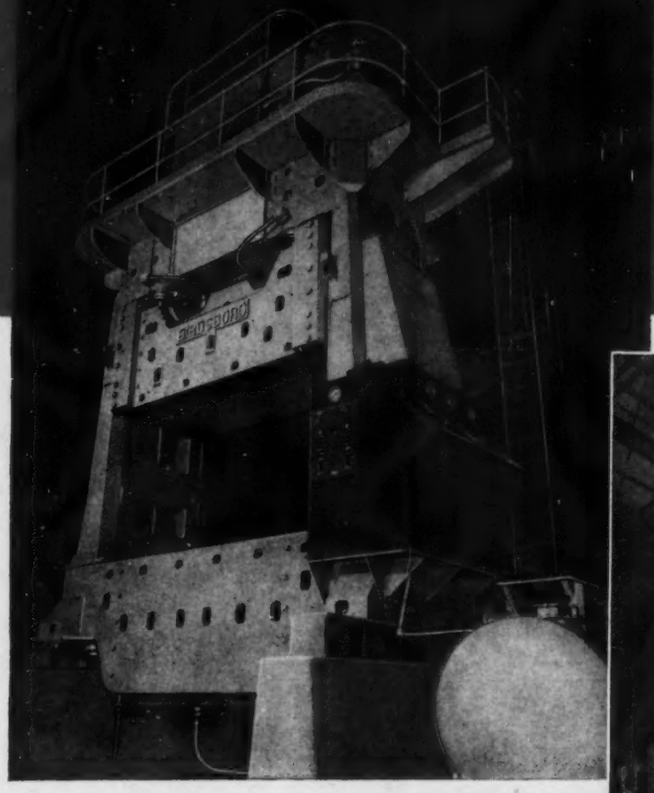
J & L—PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

J&L STEEL

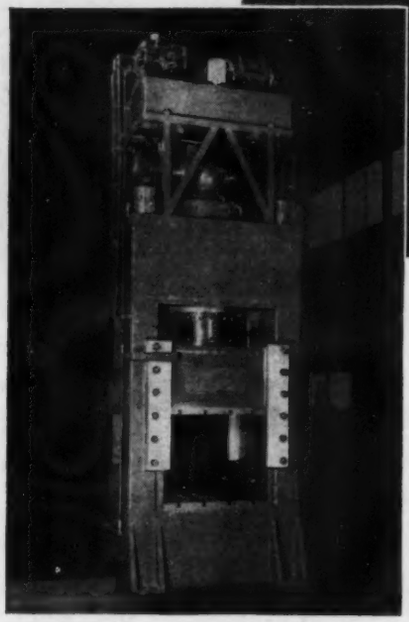
J & L—PARTNER IN PROGRESS TO AMERICAN INDUSTRY

PRESTIGE



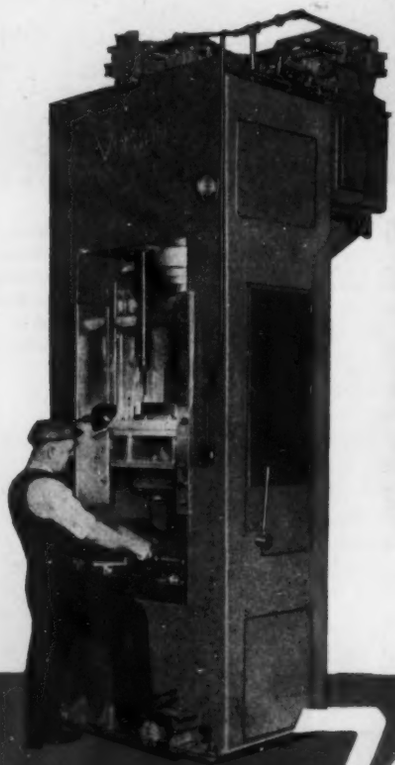
Birdsboro 550-ton Hydraulic Press for forming large automobile and airplane parts. Equipped with Oilgear fluid power feeds, using Bantam Bearings.

Farrel-Birmingham 500-ton Hydraulic Press. Powered by Oilgear equipment in which Bantam Bearings are used.



Beatty 750-ton Hydraulic Straightening Press. Equipped with Oilgear fluid power pump, using Bantam Bearings.

Chambersburg 100-ton Vertical Hydraulic Cupping and Drawing Press. Equipped with 150 H.P. Oilgear fluid power pump using 4 Bantam Bearings.



Vereen 150-ton Hydraulic Speed Press. Operated by Bantam Bearing equipped Oilgear power pump.

YOU CAN RELY ON

SAFEGUARDED *by* A GOOD BEARING

EACH of the manufacturers of these huge production machines has built up tremendous prestige based on impressive records of dependable performance. One of their greatest problems was to provide perfect power control, and each has solved it completely by the use of OILGEAR fluid power pumps, equipped with Bantam Bearings.

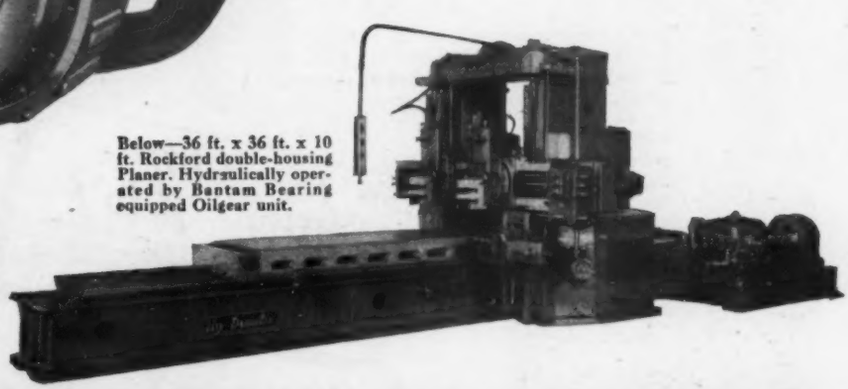
Where power requirements are most exacting . . . where replacements are difficult . . . where stamina and durability are essential — Bantam Bearings are gaining ever greater preference because of their performance records on the most difficult jobs.

Bantam makes *three distinct types* of bearings — to better solve your every bearing problem.

BANTAM BEARINGS CORPORATION
SOUTH BEND, INDIANA
Subsidiary of THE TORRINGTON CO., Torrington, Conn.

Above—Clearing 50-ton Hydraulic Die Spotting Press. Powered by an Oilgear unit—Bantam Bearing equipped.

At left—Watson-Stillman 200-ton Single Action Drawing Press, operated by Oilgear DX-15025 pump —Bantam Bearing equipped.



Below—36 ft. x 36 ft. x 10 ft. Rockford double-housing Planer. Hydraulically operated by Bantam Bearing equipped Oilgear unit.

BANTAM BEARINGS

TAPERED ROLLER •• STRAIGHT ROLLER •• BALL

*ONE CUTTING OIL

to cover 90% of all machining needs

That statement covers a lot of territory, but it is a fact proven time and again by many plants throughout the country. Whether you machine great gears or tiny watch parts, *CUT-MAX Base No. 7 will perform better and more economically than any other straight cutting oil. We'll prove this whenever you say . . . in *your* plant . . . under *your* operating conditions.

Recently developed, this product is the most concentrated base ever created for dilution into cutting oils. It contains a minimum of 18% superactive *added* sulphur—combined in a colloidal state. *CUT-MAX Base No. 7 is unequalled in refrigerating and cutting efficiency. It will perform equally well for all ferrous metal machining operations. Call the Houghton man!

It's Houghton 2 to 1

A national, independent survey on cutting oil preference found Houghton the favorite by 2 to 1 over the second choice. Ask for details.

E. F. HOUGHTON & CO.

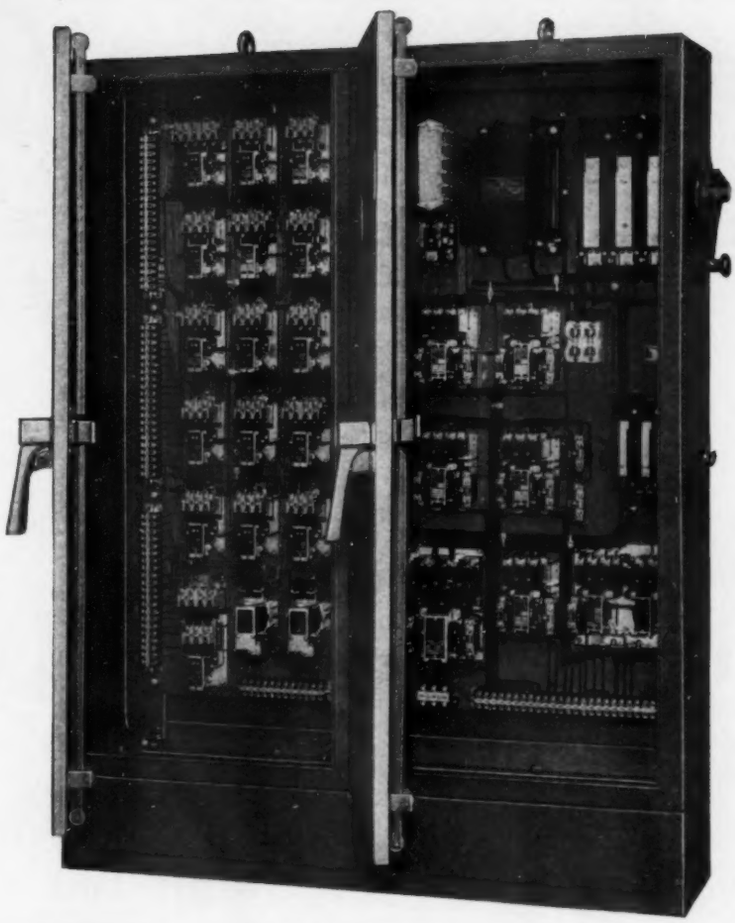
Third, American & Somerset Sts.

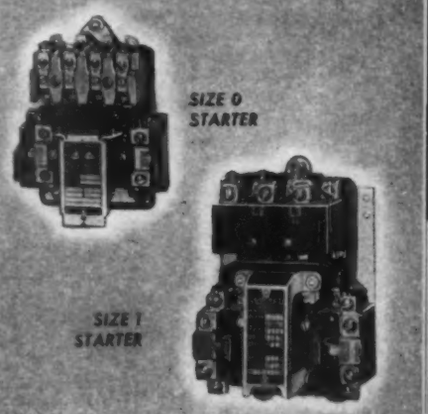
Chicago PHILADELPHIA Detroit

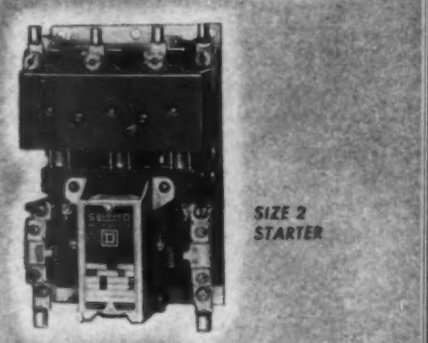
CUT-MAX BASE No. 7

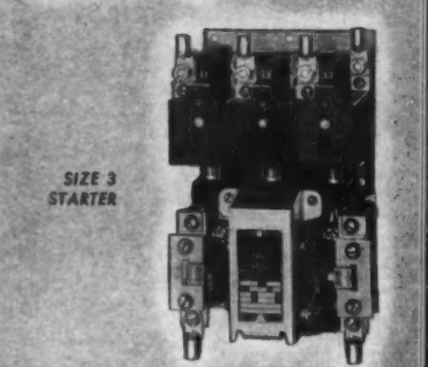
D Leads

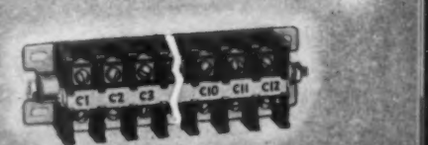
IN THE DESIGN AND MANUFACTURE OF MACHINE TOOL CONTROL

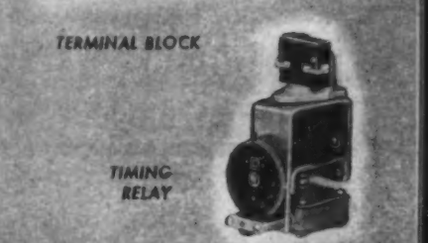












● **All types and sizes of standard Square D automatic motor control are designed for panel board mounting; automatic starters, magnetic contactors, timing mechanisms, interlocking relays, switches, circuit breakers, and overload protective devices. These are stock items and can be quickly and economically assembled in any form of machine tool panel board.**

This broad range of standard apparatus—plus engineering service, founded on years of experience in designing automatic control panels, make Square D the logical choice of machine tool builders.

For sound engineering, economical manufacture and dependable service

CALL IN A SQUARE D MAN

SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

INGERSOLL'S *D-B-L for HACK SAW BLADES

*Produced under exclusive license arrangement with Allegheny - Ludlum Steel Corporation.

One of Many Special Steels

Ingersoll's D-B-L, the sensational new Tungsten-Molybdenum High-Speed Steel for Hack Saw Blades, is just one of the many "Special Steels for Special Uses" produced by the Ingersoll Steel & Disc Division of Borg-Warner Corporation.

An Entirely New High-Speed Steel

This amazingly efficient low cost steel, known as Ingersoll's D-B-L, is an entirely new high-speed steel, representing a new combination or balance of the carbide-forming elements . . . Tungsten, Molybdenum, and Vanadium. Its outstanding characteristics are high impact resistance, tough cutting edge, relative freedom from decarburization and *Lower Cost.*

Specify

INGERSOLL'S D-B-L

on orders for Hack Saw Blades

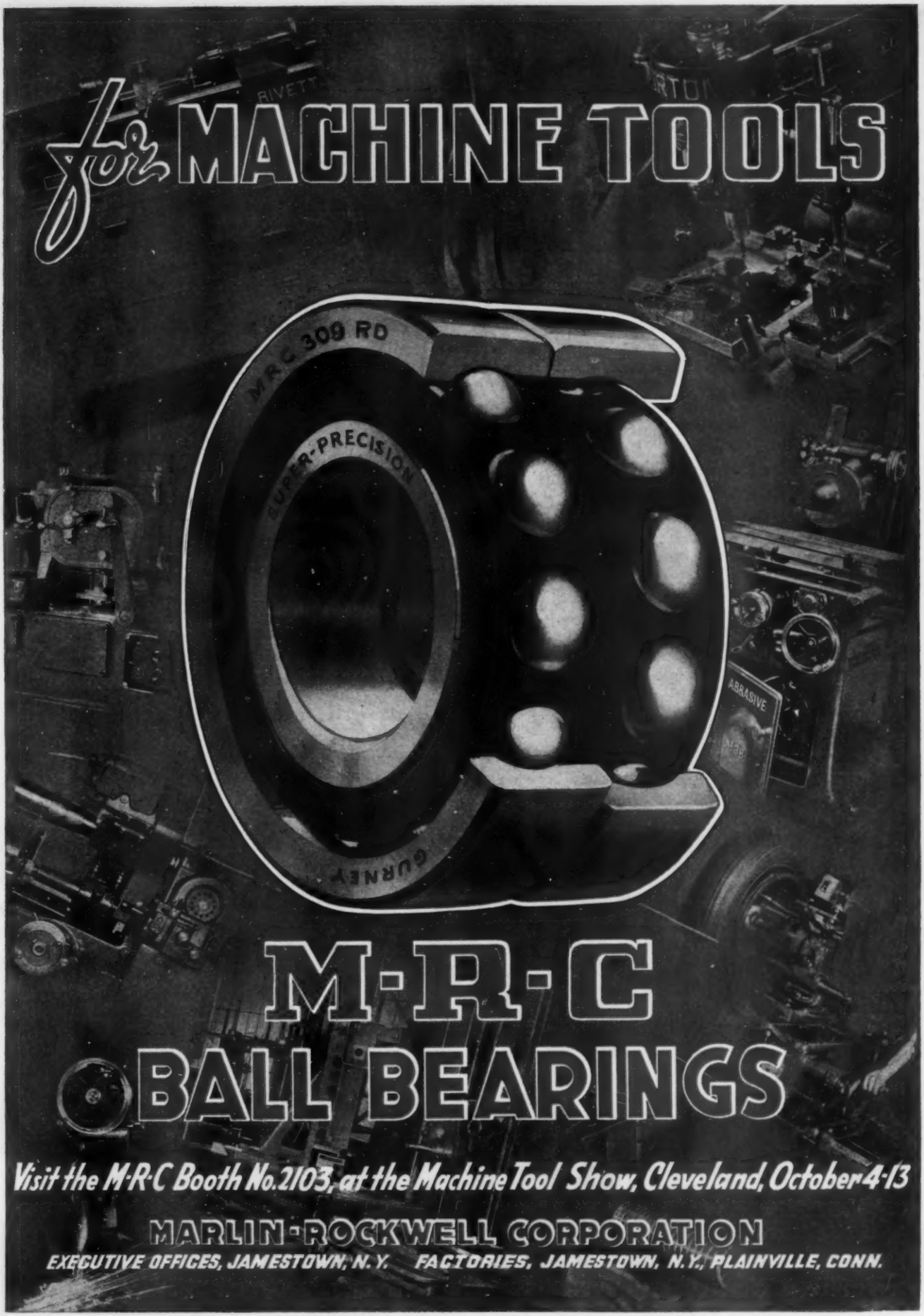
Other Special Ingersoll Sheet Steels include:

Alloy Steels
Clutch Plate Steels
Tillage Steels
Shovel Steels
Knife Steels
Tem-Cross Steel
IngAclad
(Stainless-Clad Steel)
and Saw Steels, including
"18-4-1", Molybdenum
and D-B-L

INGERSOLL STEEL & DISC DIVISION

BORG-WARNER CORPORATION — **NEW CASTLE, INDIANA**

Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan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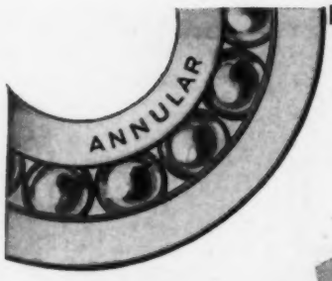

for ALL machines and PRODUCTS

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"Commercial" Annular Ball Bearings are used in hundreds of different industries and products. High efficiency and low cost combine to make these bearings the choice of manufacturers who seek precision performance. **"Commercial"** Annular Ball Bearings are self-contained. Speeds up to 2500 R. P. M. Dual thrust capacity. Overloads and side-thrusts easily sustained. High grade steels, carefully heat-treated, assure strength and stamina essential to long service.

Write for complete information and latest catalog.

"Commercial" ANNULAR BALL BEARINGS

THE SCHATZ MANUFACTURING CO., POUGHKEEPSIE, N. Y.

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SEND FOR YOUR COPY TODAY

Here's the catalog the machine tool industry has long been waiting for. Forty pages are profusely illustrated with 26 designs of modern spindle mountings on lathes, automatics, tail stocks, boring mills, milling machines, grinders, etc. Six pages contain dimensional data, and three pages are devoted to vital information on mounting and care of spindle bearings. *Every page is a mine of information you need every day.* Send direct for a copy, today.

4445

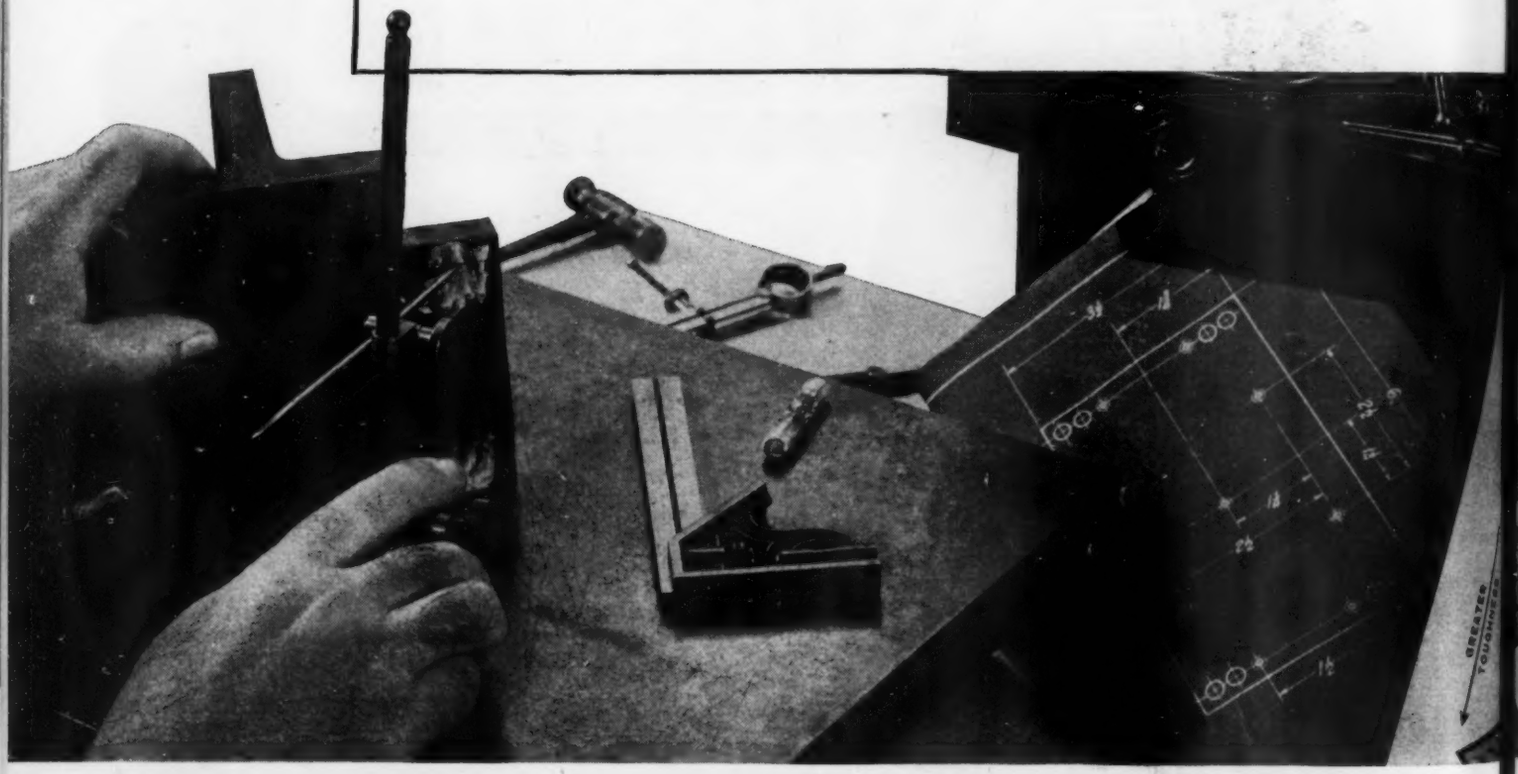
3 WAYS TO CASH IN ON THE *Matched Set Method* OF TOOL STEEL SELECTION

HERE is a modern time-saving method that can simplify your work and cut tool costs. It has been adopted as standard practice by many of the nation's biggest plants—and is proving equally satisfactory in ironing out tool problems in hundreds of average sized and small shops.

But the Matched Set Method is more than just a system—it gives you the right steels to go with it, and complete instructions to make it work.

Check up now on the three ways that you can benefit by applying this easy-to-use method in your plant:

- ***In Your Tool Room***—by simplified tool steel selection, by lower tool steel inventories, by reductions in trouble, by quick answers to questions.
- ***In Hardening***—by putting at your fingertips complete instructions on how to give your tools, *at will,* the extra wear resistance, hardening accuracy, toughness, or red-hardness they may require . . . and do it with your regular shop heat treating equipment.
- ***In the Shop***—by longer runs between dressings, by increased production per tool, by greater freedom from tool troubles.



Carpenter **MATCHED**

Without Carpenter Matched Tool Steels in your tool room, you are bound to miss out on some of these benefits.

Line up now with other progressive, alert plants that are finding the Matched Set Method of tool steel selection the real way to modernize tool making procedure.

Send now for your ticket to lower tool costs — the handy Tool Steel Selector Wall Chart illustrated below. It starts you off on the Matched Set Method — shows how to apply it successfully and what to do to cash in on its advantages. For your copy of the Wall Chart, mail the attached coupon now — no obligation.

THE CARPENTER STEEL COMPANY
READING, PA.

The Tool Steel Selector
for use in your TOOL ROOM
A READY REFERENCE CHART OF CARPENTER MATCHED TOOL STEELS TO HELP YOU PICK THE RIGHT TOOL STEEL FOR EACH JOB
THE OIL-HARDENING MATCHED SET
THE WATER-HARDENING MATCHED SET
THE RED-HARD MATCHED SET
K-W WATER-WEAR
STAR-ZENITH RED-WEAR
SPECIAL WATER-HARD
D.Y.O. RED-HARD
GREATER WEAR RESISTANCE

USE THE MATCHED SET METHOD TO SOLVE PROBLEMS LIKE THESE—

TO OVERCOME BREAKAGE OF FRAGILE EDGES — The maker of this piercing die turned to Carpenter's Tool Steel Selector. The trouble — breakage of the small points in service — indicated a need for a better balance between *Toughness* and *Wear Resistance* and the job itself called for *Hardening Accuracy*. Thanks to the Tool Steel Selector, he was able to put his finger on exactly the right tool steel to meet the conditions — Carpenter's oil-hardening Stentor.

TO GET A BETTER FINISH FROM HIGH SPEED TOOLS — Thanks to Carpenter's service data, the man who made this forming tool discovered that Carpenter's high speed Star-Zenith had greater red-hardness and keener, tougher cutting edges. In addition, he was able to harden it in just the right way to most fully bring out these qualities in the finished tool. He's getting 4800 pieces between tool dressings and look at the finish on the piece.

TO GET GREATER SAFETY IN SERVICE AND HIGHER PRODUCTION — This cold heading die holder has held up for one year and 75,600,000 shocks without breakage and is still going strong. Former holders broke at the screw holes within a few weeks. This is the kind of reputation-making find that makes tool men so enthusiastic about Carpenter's Matched Set Method and Carpenter's Matched Tool Steels.

FREE THIS WALL CHART
TO TOOL STEEL USERS IN U. S. A.

THE CARPENTER STEEL COMPANY
109 W. BERN STREET, READING, PA.

Please send me free, and without obligation, a copy of your large Wall Chart Tool Steel Selector.

NAME.....

TITLE.....

FIRM.....
(Firm name must be given)

ADDRESS.....

CITY..... STATE.....

TOOL STEELS

NO DIRT CAN PASS THIS SEAL

SEALMASTER BEARINGS

Bearing users in increasing numbers are proclaiming the new SEALMASTER Pillow Blocks, Flange and Take-Up Units with their CENTRIFUGAL LABYRINTH SEAL the most outstanding bearing development in years!

Why? Because of the absolute effectiveness with which the advanced seal design in these Industrial Bearing Units *seals bearing against all foreign materials* and *retains lubricant.*

Dirt cannot get into this bearing through the self-contained seal; even though bearing is removed from housing, dirt cannot enter. Wear or glazing of felts is positively avoided by the grease labyrinth seal between cup and felt.

SEALMASTER Pillow Blocks, Flange and Take-Up Units are the *only* self-aligning Bearing Units with seals built in as an integral part of the bearing proper—independently of the housing.

Investigate today this NEW HIGH IN BEARING EFFICIENCY . . . AVAILABLE AT LOW COST. *Send for new catalog 739!*

PILLOW BLOCKS

FLANGE UNITS

TAKE-UP UNITS

- BEARING DIVISION -

STEPHENS-ADAMSON MANUFACTURING COMPANY

16 RIDGEWAY AVENUE

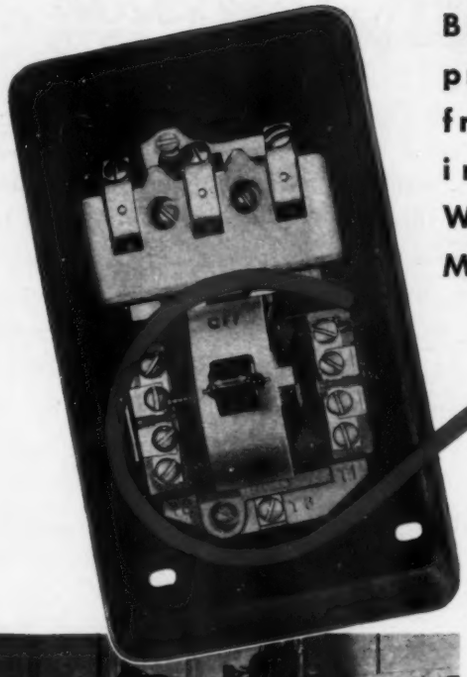
AURORA, ILLINOIS

Los Angeles, Calif. Belleville, Ontario

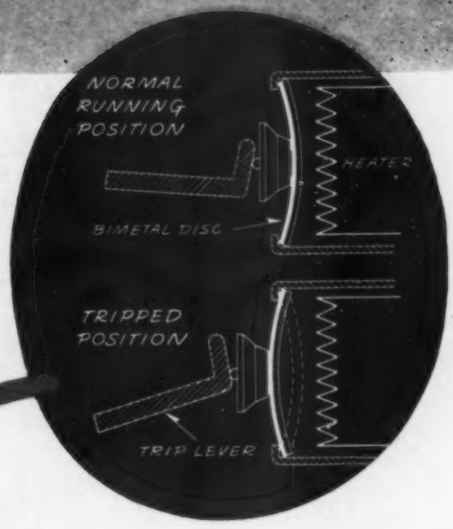
ENGINEERING SALES OFFICES IN PRINCIPAL CITIES

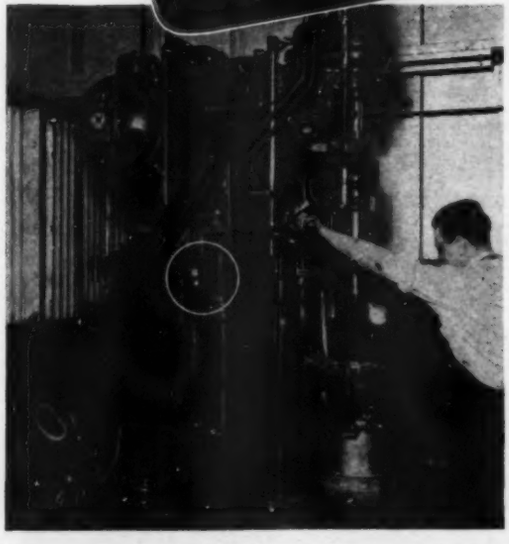
PERMANENTLY SEALED AGAINST DUST AND GRIT • • •

lifetime calibration



Bi-metal disc protects motor from overload in this new Westinghouse MOTOR STARTER





Nothing to renew or replace

In this new manually operated motor starter, a snap action bi-metal disc protects the motor from overload. When heated by an overload current, it automatically disconnects the motor from the line before heat can damage windings. The bi-metal disc simply snaps back to normal running position — there is nothing to renew, adjust, or replace. The calibration of the bi-metal does not vary even after repeated operation.

Specify the starter with these moneysaving features

- "De-ion" Arc Quenchers prevent flashovers — prolong contact life.
- Indicating handle shows clearly whether starter is On, Off or Tripped.
- Safety interlock prevents accidental contact with live parts.

The Westinghouse "De-ion" Motor Watchman is available for motors up to 7½ hp. Your nearest Westinghouse distributor stocks them, or you may get complete data from any Westinghouse office or industrial agent.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh, Pa.

J-20850

Westinghouse

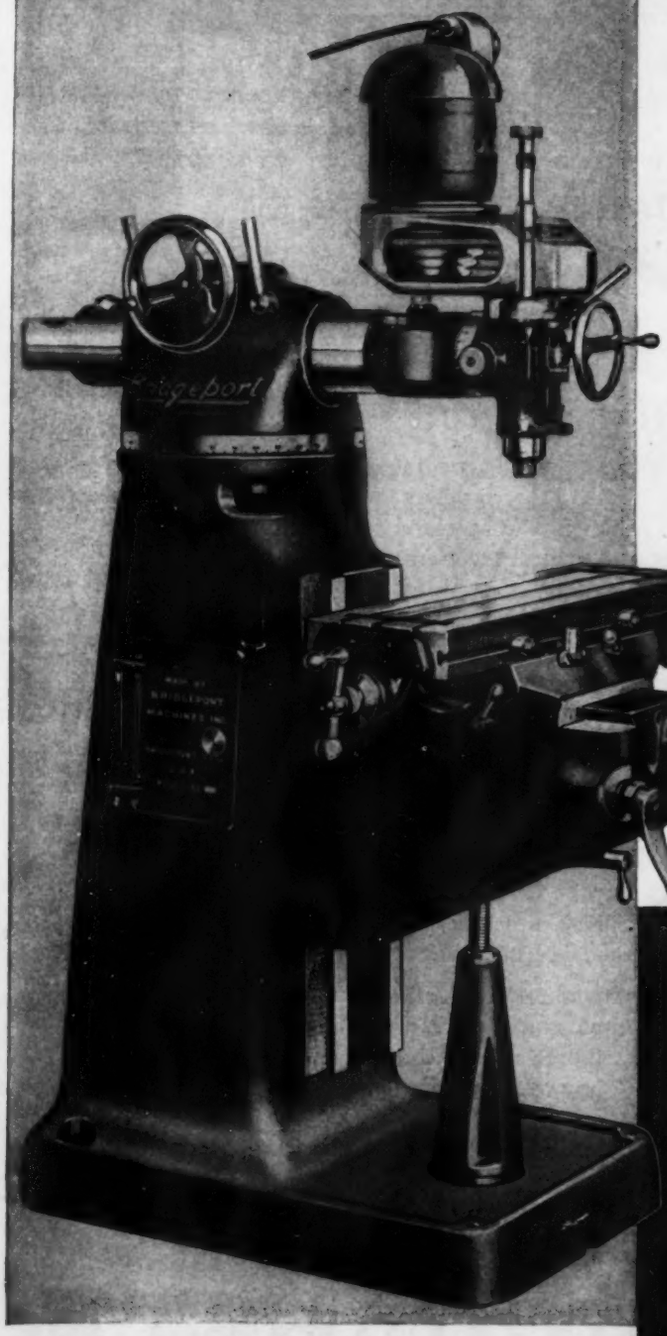
WESTINGHOUSE ELECTRIC

"De-ion" Motor Watchman

This New Bridgeport Turret Milling Machine is

DEAD ACCURATE AND CHATTER-FREE

on "NORMA-HOFFMANN" Precision Bearings



Rigidity, accuracy, and vibrationless operation characterize this new machine and are featured by the builders—Bridgeport Machines, Inc., Bridgeport, Conn. * * * * To achieve and to maintain these characteristics, it was natural for Bridgeport engineers to choose NORMA-HOFFMANN PRECISION BEARINGS for every rotating point throughout the machine.

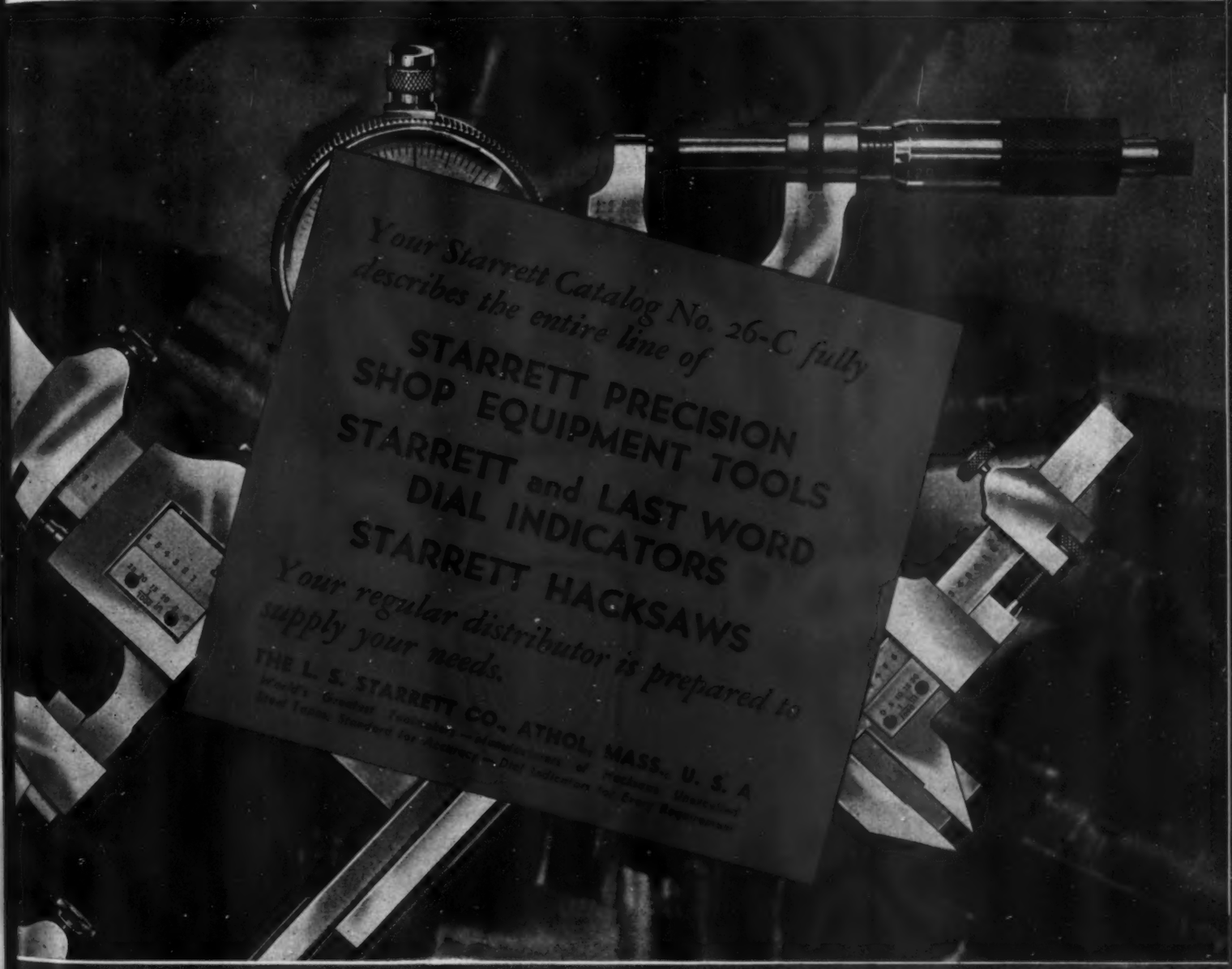
Sixteen NORMA-HOFFMANN PRECISION BEARINGS are used, in all: 6 paired and preloaded ball bearings on the milling spindle; 7 felt-sealed ball bearings on table, cross-feed, and knee elevating shaft; 1 "Cartridge" ball bearing on the elevating screw; and 2 shielded ball bearings on the overarm worm.

Whatever the problem, there is a NORMA-HOFFMANN PRECISION BEARING to solve it—108 distinct series embracing over 3000 catalogued sizes, to meet every load, speed and duty. Let our engineers work with you. Write for the Catalog.

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U. S. A.

What's new?

IN PRECISION TOOLS • STEEL TAPES
DIAL INDICATORS • HACKSAWS


Your Starrett Catalog No. 26-C fully describes the entire line of
STARRETT PRECISION SHOP EQUIPMENT TOOLS
STARRETT and LAST WORD DIAL INDICATORS
STARRETT HACKSAWS
Your regular distributor is prepared to supply your needs.
THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.

Standardize on

STARRETT TOOLS

BUY THROUGH YOUR DISTRIBUTOR

. . EQUIP . . that modern machine with modern tools

Let's turn the spotlight on the tools that do the actual cutting. They make—or break—your whole machine tool investment. Do you realize the amount of patient research and study that is behind the design, the steel, the heat treatment of every G.T.D. Greenfield Tap, Die, Twist Drill, Reamer or Gage?

Do you know, for example, about "Maxi" finish, a surface treatment for taps and drills, developed by G.T.D. Greenfield, that has increased production as much as 1000% in gritty or abrasive materials?

Good small tool manufacture today calls for engineering and mechanical experience of a high order. The possession of such experience explains why G.T.D. Greenfield is the world's largest manufacturer of thread cutting tools. This experience is at your disposal without cost or obligation. Ask for it.

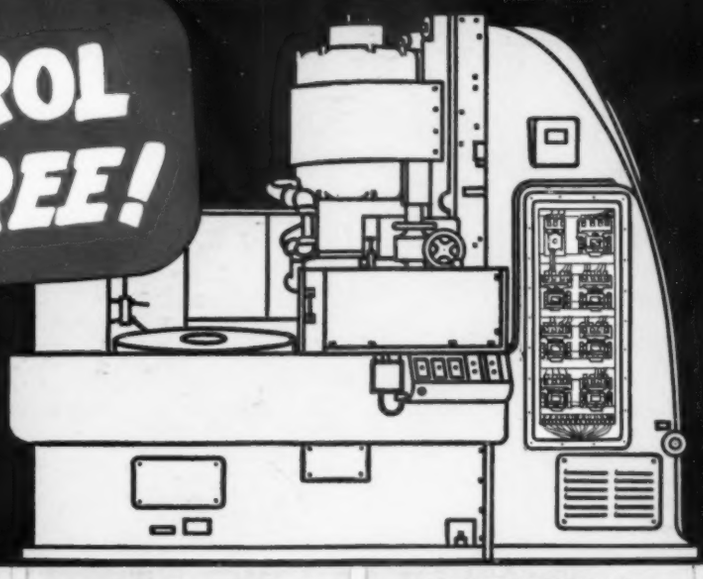
GREENFIELD TAP & DIE CORPORATION
GREENFIELD, MASSACHUSETTS

Detroit Plant: 2102 West Fort St.
Warehouses in New York, Chicago, Los Angeles and San Francisco
In Canada: Greenfield Tap & Die Corporation of Canada, Ltd., Galt, Ontario

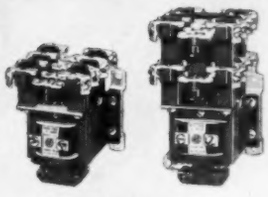
GREENFIELD

FOR YOUR MACHINE TOOLS—

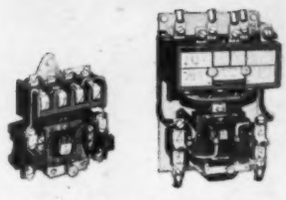
MOTOR CONTROL *that's* TROUBLE-FREE!



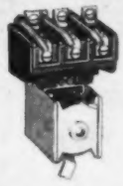
There are fewer moving parts to give trouble in these simple and rugged Allen-Bradley control units. That's why they are preferred by so many machine tool builders. The few standard items listed below are the basic units from which the majority of special Allen-Bradley control panels are built.



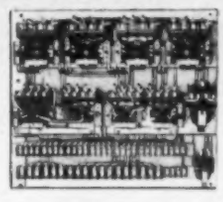
Solenoid Relays
Bulletin 700 — Furnished in over 300 types. One to eight poles. Compact and reliable.



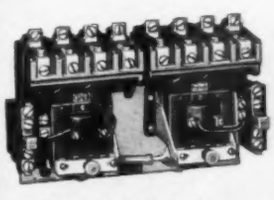
Across-the-Line Starters
Bulletin 709—For across-the-line squirrel-cage motors. Simple, rugged construction.



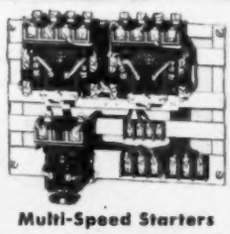
Disconnect Switch Unit
Bulletin 712—Has same interrupting capacity as motor starter—same switch structure.



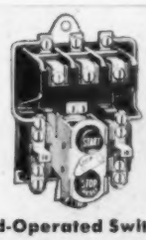
Special Control Panels
Save time and trouble by having Allen-Bradley design and build your control panels.



Reversing Switches
Bulletin 705 — For reversing squirrel-cage motors. Provides solenoid reliability and speed.



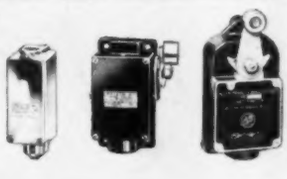
Multi-Speed Starters
Bulletin 715 — For 2, 3, and 4-speed across-the-line motors. Also in the resistance type.



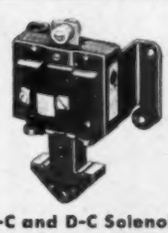
Hand-Operated Switches
Bulletin 609 — A quick action switch. Push-button control and overload protection.

Solenoid Contactors
Bulletin 702—Sturdy construction. Available with 2 to 4 poles—ratings 10 to 100 amp.

Push-Button Stations
Bulletin 800 — Designed especially for machine tools.



Limit Switches
Bulletin 801 — Furnished in 253 different types. Limit switches for any machine tool.



A-C and D-C Solenoids
Bulletin 860 — Quiet operation. In 8 sizes and various mountings. Thrusts to 16 lbs.

Plugging Switches
Bulletin 802—Used with reversing switches to provide quick stopping of machines.

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

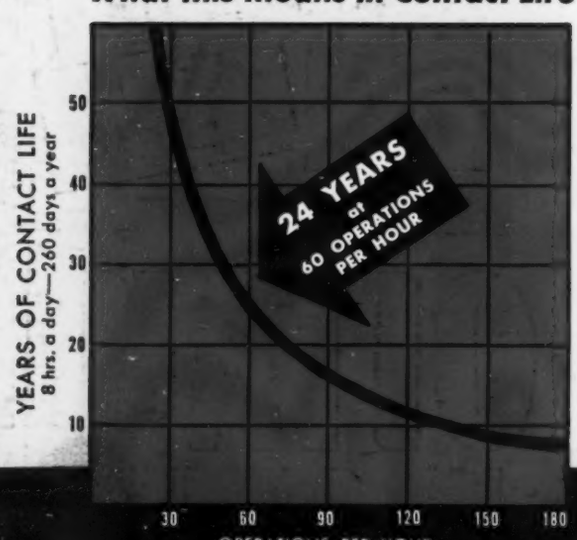
CONTACT TESTS SHOW 3 MILLION INTERRUPTIONS

Mechanism of Size 1, Allen-Bradley Bulletin 709 Solenoid Starting Switch, tested at 150 amperes, inductive current, and 220 volts.

Testing an Allen-Bradley Bulletin 709 Solenoid Starting Switch to determine how many times it is capable of interrupting an overload. In this test, which is a particularly severe one, many years of starter life are condensed into a few weeks or months. Thus is starter stamina measured.

—at SIX TIMES RATED CAPACITY!

What this means in Contact Life



Use this chart to determine how long the contacts on a Size 1, Allen-Bradley Solenoid Starter will last on your job with no maintenance or attention whatever.

Imagine, if you can, three million switch interruptions at six times rated load! That's the average life you can expect from the contacts in an Allen-Bradley Size 1 Solenoid Starter, as indicated by actual tests. It's equivalent to one operation a minute continuously, eight hours a day, for 24 years.

The secret of such unequalled performance lies in the contacts themselves and their vertical straight-line motion. These double break contacts, being made of a patented cadmium silver alloy, never need cleaning or filing, as do copper contacts. The cadmium in the contact metal helps to snuff out the arc. Each main contact unit is enclosed in its individual arc chamber, thereby increasing the capacity of the switch, without danger of flashovers. It is no wonder these Allen-Bradley contacts are free from trouble and are good for millions of operations with no maintenance whatever.

Allen-Bradley Company, 1310 S. Second Street, Milwaukee, Wis.

A·B

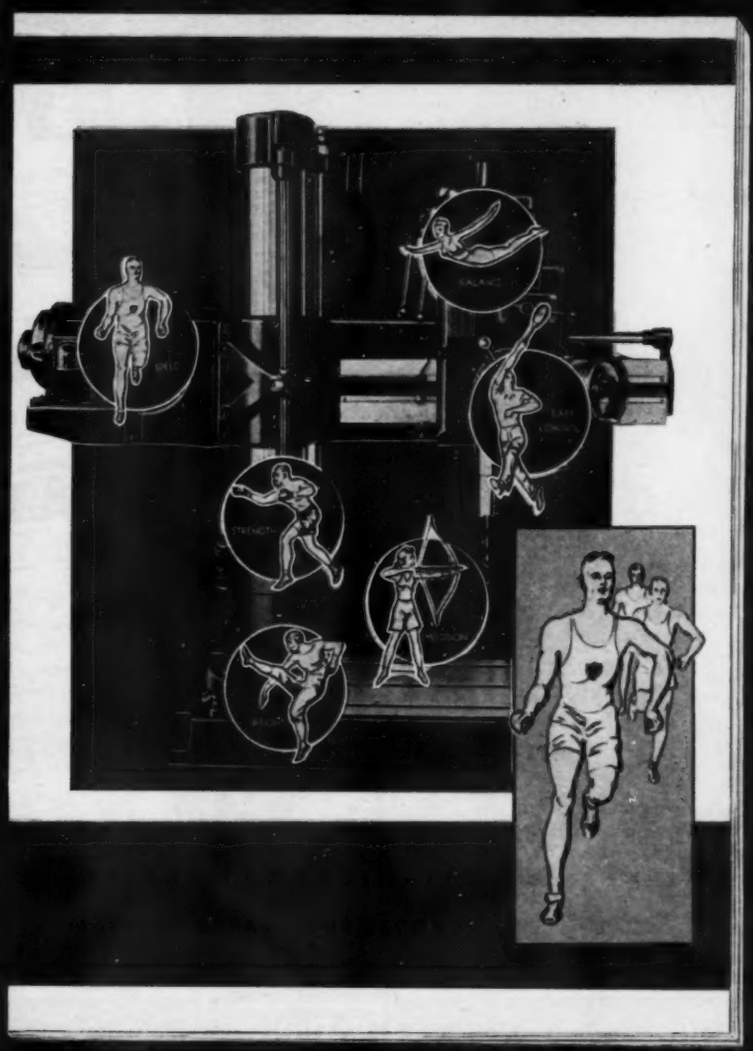
ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

QUALITY

ANNOUNCING A NEW

MOR-SPEED RADIAL DRILL



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THE MORRIS MACHINE TOOL CO.
CINCINNATI, OHIO, U.S.A.

SOLD BY PRATT AND WHITNEY
DIVISION NILES BEMENT POND CO.

AT WORK IN EVERY INDUSTRY

- In every industry, where things are made for Man's Needs, Comforts or Pleasures, there NATIONAL Metal Cutting Tools are found at work.
- Chosen on their merits, they are finding an ever widening field.

STEEL MAKING AND CONSTRUCTION
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Home Office and Factory—DETROIT, U.S.A. • Tap and Die Division—WINTER BROS., Wrentham, Mass.
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"SERVICE PROVED" *lubricants gave it to* MEAD SCREW PRODUCTS COMPANY

D. C. Mead, pressed for time in filling an important customer's order, consulted Cities Service Lubrication Engineers. After a study of his problem, they recommended the correct Cities Service Cutting Lubricant—increasing his production speed 25%, lengthening cutting tool life and helping Mr. Mead turn out a better finish.

You, too, will find our Lubrication Engineering service a help in turning out work that meets the demands of your most discriminating customers. This service offers you the culmination of a long and varied experience in the solving of many cutting oil problems—plus oils developed as a result of this experience.

Let one of our Lubrication Engineers prove the value of these oils to you in your own operations. There is no obligation.

CITIES SERVICE
Cutting Oils
"SERVICE PROVED"

FREE!
Just Clip and Mail

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Sixty Wall Tower—Room 1626A, New York, N. Y.

Please send me a copy of your *free* folder "Metal Cutting Lubrication."

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OUT IN FRONT . . .

VICKERS Balanced Gear Fluid Motor provides efficient and compact variable speed rotary drives. Available in wide range of sizes.

VICKERS Balanced Vane Type Pump for continuous working pressures up to 1,000 lb. per sq. in. Extremely quiet in operation.

VICKERS Double Pump and Combination Valve Assembly delivers large volume at low pressure and relatively small volume at high pressure. Quiet.

VICKERS Electric-Hydraulic "Traverse and Feed" Panels are available in several types and sizes. Only two moving parts—no latches or linkage.

VICKERS Flow Control Valve provides positively controlled rate of flow not affected by changes in operating pressure or work resistance; also has temperature compensation.

Your hydraulic drive and control problems will have the benefit of the experience gained by Vickers engineers in developing thousands of applications, the following being representative:

MACHINE TOOLS
"Feed and traverse" cycles, reciprocating cycles, indexing drives, spindle drives, unit head installations, clamping and chucking, clutch control.

SPECIAL PURPOSE AUTOMATIC MACHINERY
Applications so varied that each is a hydraulic control problem entirely its own, utilizing standardized Vickers Controls of all types.

PLASTIC INJECTION AND DIE CASTING MACHINERY
Controls for die operation and material injection . . . either manual or automatic cycles with safety interlock features.

PRINTING MACHINERY
Tension and impression controls, matrix press operation, variable speed press drives, handling equipment.

HYDRAULIC PRESSES
Controls for forming, coining, drawing, piercing, riveting, straightening and bending operations . . . variable and constant delivery high pressure installations for small or large work.

STEEL MILL EQUIPMENT
Hydraulic furnace pushers, stock handling equipment, roll balancing and forging manipulator controls.

WELDERS
Work clamping, and operation of spot, projection, butt and seam welding cycles.

AVIATION CONTROL DEVICES
Light weight pumps, fluid motors and hydraulic control units for varied aeronautical applications.

A complete line of manually and mechanically operated Vickers Pilot Valves is available.

VICKERS 3-, 4-, 5- and 6-Way Valves are available with many modifications including manual, latch, pilot or solenoid operation.

VICKERS Hydraulic Relief Valve (Balanced) for various pressure and capacity ranges. Smooth and quiet in operation.

VICKERS
HYDRAULIC CONTROLS AND DRIVES

In this Machine Tool Show Issue Print, you will find a great preponderance of Vickers-equipped machine tools.

Forty-seven (47) manufacturers had planned to exhibit Vickers-equipped machines in Cleveland.

Again in 1939, as in 1935, Vickers is *out in front.*

Machine tool builders everywhere are finding Vickers equipment the best answer to a host of control and drive problems.

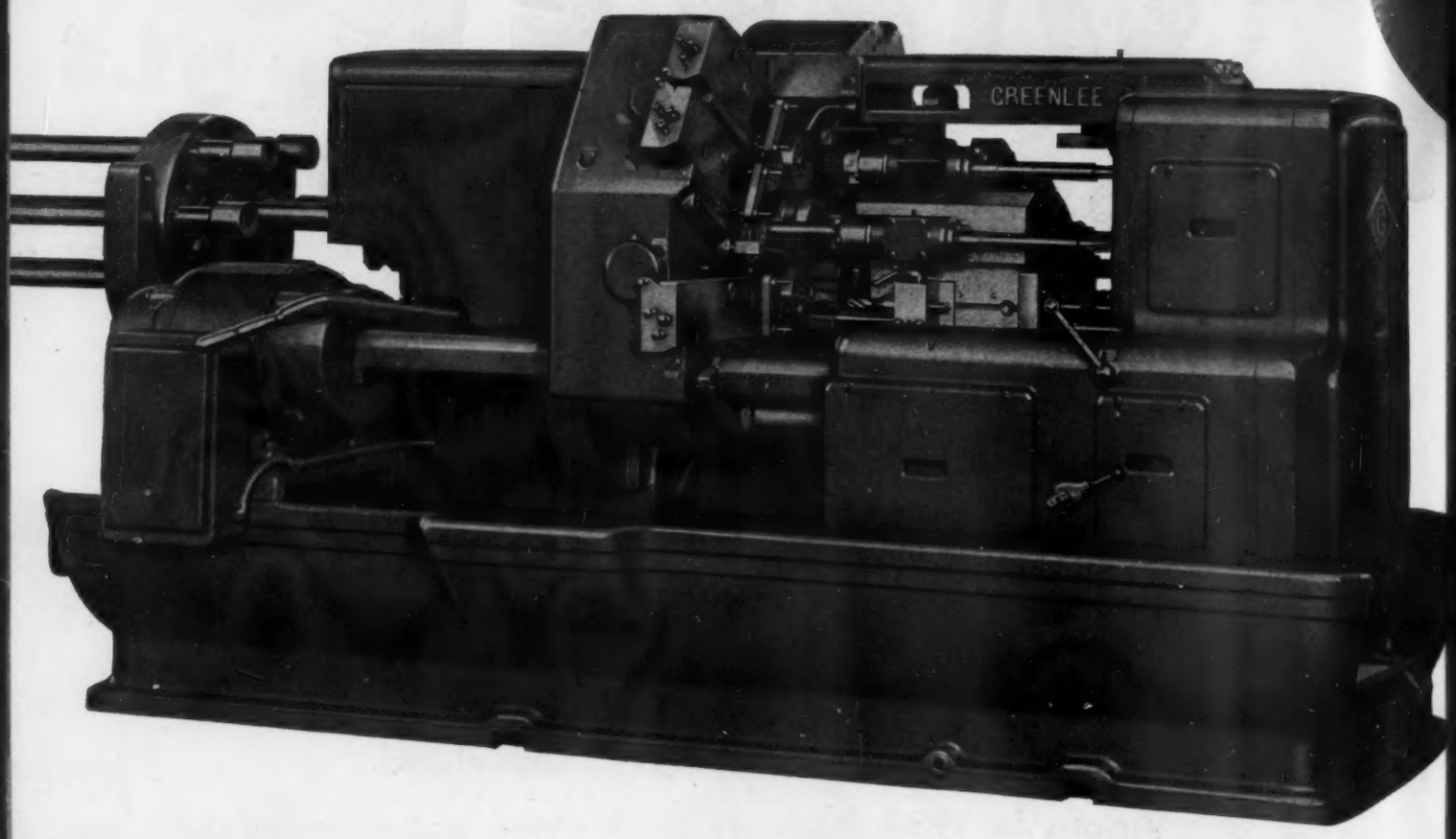
VICKERS *Incorporated* • 1454 OAKMAN BLVD., DETROIT, MICH.

VICKERS Hydraulic Variable Speed Transmission, used for wide variety of rotary drives. Integrally built controls for every need.

VICKERS Solenoid Operated Valves provide direct electrical control, where required, for all hydraulic systems.

VICKERS Variable Volume Pumps of multi-cylinder type available in various capacities and maximum operating pressures up to 2,500 lb. per sq. in.

WHEN You SEE THE



The tool slide traveling its full stroke on totally enclosed, hardened steel ways at each cycle of the machine, has quick approach and work speed travel controlled by easily adjusted dogs carried on the worm spider—Another reason why the Greenlee can be quickly and accurately set up.

This view shows one of the reasons why the Greenlee Automatic is such an easy machine to change over. Threading can be done in four positions, high speed drives are provided in all six. Indexing type cross slide stops are located at the rear of the slides, out of the way of chips and dirt for very close forming.

GREENLEE

6-SPINDLE Automatic SCREW MACHINE

What you really want to see in a modern 6-spindle Automatic Screw Machine, you'll see in the GREENLEE—with all the advantages you're seeking in the way of performance.

You'll see compactness, accessibility and openness for quick changeover. You'll see how the collets and pushers can be changed from one position without indexing the head and how all controls are grouped within easy reach of the operator.

You'll see one important feature after the other which combined, materially lessen your set-up and production costs.

Here are other reasons for excellent profit making performance that will interest you. The six independent forged steel cross slides are actuated by standard interchangeable cams. The tool cavities are designed for interchangeability of tool holders. The end working tool slide can be easily and quickly tooled with the stroke controlled by simple adjustable dogs on the cam spider. The new Greenlee is equipped with Built-in Set-up Lighting and Automatic Cycling Stop as well as a stock reel offering new features. For complete details — write TODAY!

...You will understand what we mean when we say—SPEED and PROFIT-MAKING PERFORMANCE

...you will have seen the *Latest* IN

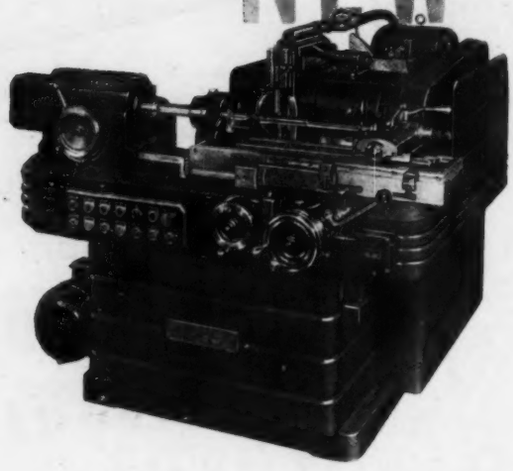
ACCESSIBILITY
FLEXIBILITY
COMPACTNESS
QUICK SET-UP

and ease of control for operators...

Greenlee BROS. & CO.
ROCKFORD, ILLINOIS, U.S.A.

FOR PRECISION THREAD GRINDING AT LOW COST
EX-CELL-O *announces*

NEW



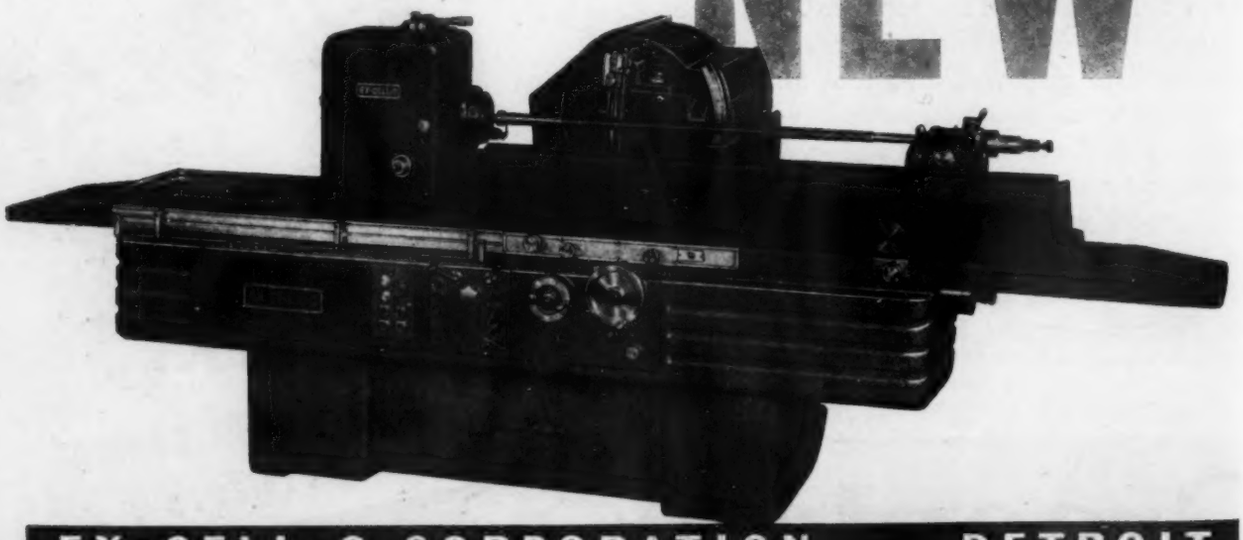
For precision grinding external threaded sections up to 6" outside diameter, having as much as 8" length of thread, on work up to 18" between centers Style No. 33

NEW

For precision grinding internal threads up to 9½" inside diameter, having as much as 4" length of thread, in work up to 10" outside diameter, 13" long overall. Style No. 39

For precision grinding external threaded sections up to 12" outside diameter, having as much as 50" length of thread, on work up to 115" between centers. Style No. 50. Send for catalog on Ex-Cell-O Precision Thread Grinders (seven styles).

NEW



EX-CELL-O CORPORATION - DETROIT

GIDDINGS & LEWIS

Introduces

A New Line

PLANT DEMONSTRATION · · · OCT. 9 to 14 · · · FOND DU LAC, WIS.

G&L DEMONSTRATES

THE *New* 30 SERIES-RT

WITH BUILT-IN POWER REVOLVING TABLE TO SPEED PRODUCTION . . .

A built-in power revolving table type machine is the newest addition to the well known 30 SERIES design of GIDDINGS & LEWIS high power, precision Horizontal Boring, Drilling and Milling Machines.

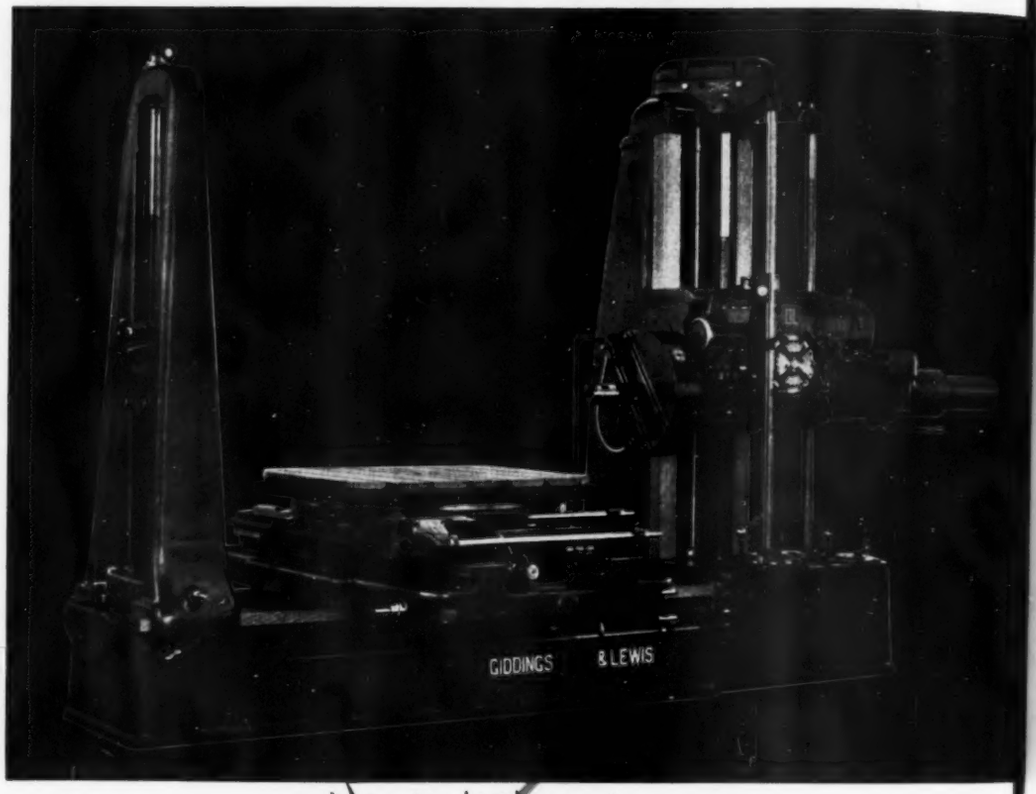
The machine as illustrated, incorporates all the features of the standard 30 SERIES design and, in addition, has a built-in combination hand and power feed revolving table.

This construction greatly increases flexibility and reduces set-up costs considerably. The revolving table allows complete turning of a job to any position within the full 360° permitting machining on different sides in one set-up and eliminating the mounting and dismounting of auxiliary rotary table with resulting loss of time.

The table top on this machine is lower than the top of an auxiliary revolving table mounted on a standard machine table. This lowering of the table height means an increase of headstock vertical range, greater convenience for the operator, and greater rigidity because the table is an integral part of the machine and mounted closer to the bed.

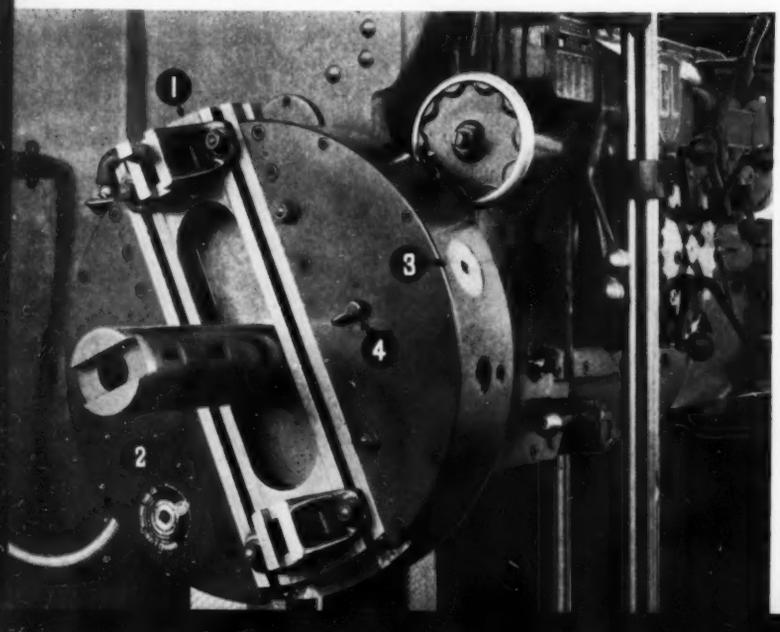
Eighteen rotary feeds and a rapid traverse may be applied to the rotary movement of the table while eighteen more feeds and another rapid traverse is provided to the 48″ cross travel of the table.

The table is graduated in 1/2°. It is provided with four indexing stops at exact 90° intervals. These stops have hand adjustment to .001″ obtained through a graduated micrometer dial. Additional indexing stops may be obtained to suit requirements.



THE *Brand New* G & L CONTINUOUS FEED FACING HEAD

Easy to Mount . . . Easy to Remove



G&L again offers to users of their machines a long desired attachment which greatly simplifies many machining problems, and opens up an entirely new field of possibilities.

Accurate facing operations may be performed, for which six separate built-in power feeds from .006″ to .125″ per revolution are available.

Accurate boring and turning operations also may be performed with various types of tools when attached to the Tee slotted slide for which micrometer hand adjustment to .001″ is provided.

It is a modern, highly beneficial accessory adaptable to practically all G&L machines.

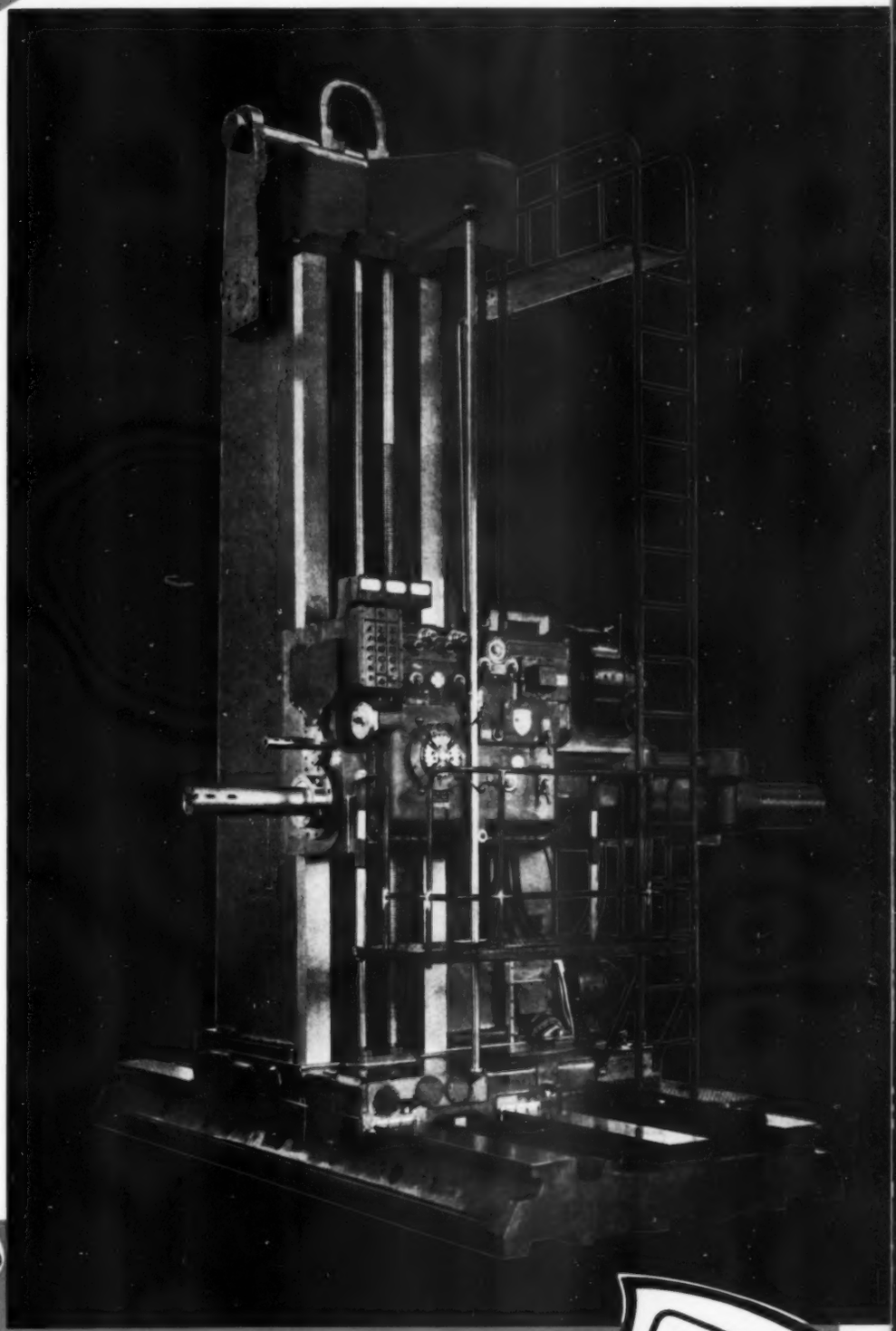
1. TOOL SLIDE: Travels diametrically across the front of the attachment. Power feed or hand adjustment.
2. FEED SELECTOR: Six power feeds in either direction.
3. MICROMETER HAND ADJUSTMENT OF SLIDE: For accurate boring adjustment.
4. DIRECTIONAL CONTROL: Lever points in direction of feed to tool slide. Neutral position is used for boring or turning.

(This accessory will be demonstrated on the above machine at the G&L Plant Demonstration October 9 to 14)

FOR THE **FIRST** TIME

THE *New* 50 SERIES

FLOOR TABLE AND PLANER TYPES



This new heavy duty design of high power precision, Horizontal Boring, Drilling and Milling Machine has a 6" main spindle and a 2½" auxiliary spindle; a 120" headstock travel and 96" travel of the column unit on the runway. This machine weighs close to 85,000 lbs., and has an overall height of 20 feet.

Certain unusual features have been incorporated in this machine as well as the two spindle design—independent operation of units, rotary feed selector, wide range of boring and milling feeds, direct reading dials, automatic depth gauge, safety limit switches and scales and adjustable verniers plus other standard G&L features. Particular attention has been given to the design of electrical controls to provide the greatest flexibility and ease of operation.

(A 50 SERIES machine of this type will be included in the G&L Plant Demonstration—October 9 to 14)

"PLANT DEMONSTRATION
OCT. 9 to 14
Write for particulars"

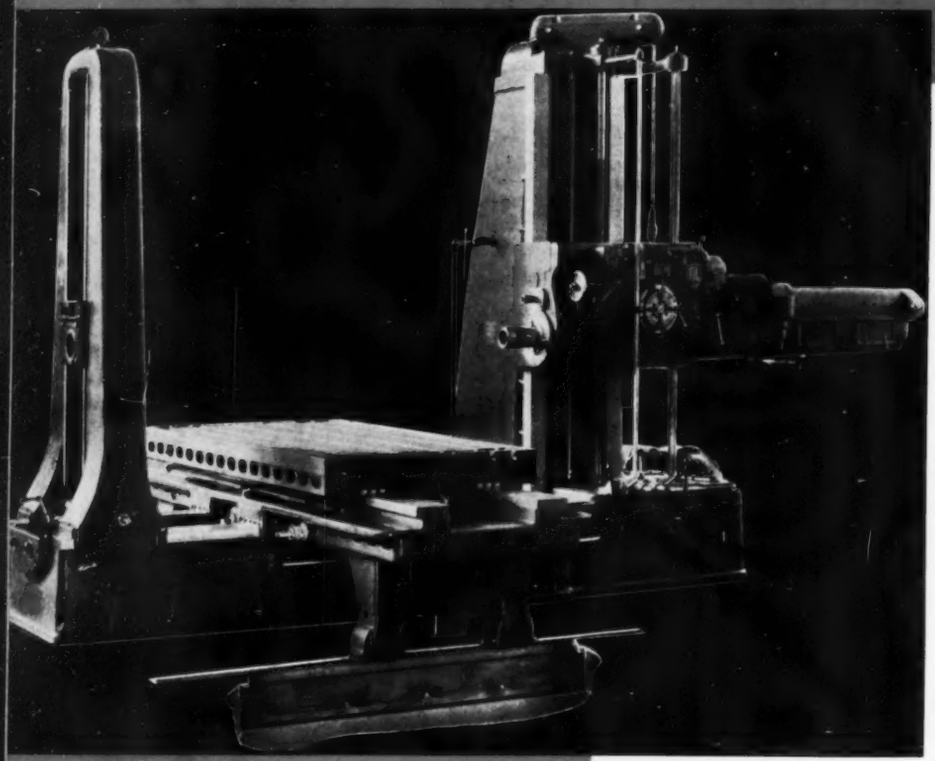
THIS EQUIPMENT AND OTHER G&L MACHINES WILL BE INCLUDED IN THE DEMONSTRATION

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

INCREASE YOUR 1940 PROFITS WITH New G&L HORIZONTALS

..... BECAUSE YOU GET ACCURACY AND SPEED WITH LESS TOOL SPOILAGE . . . REDUCTION OF WORK SPOILAGE . . . AND OPERATORS SUFFER LITTLE FATIGUE



350-T

WITH EXTENDED SADDLE, SADDLE SUPPORTS AND AUXILIARY RUNWAYS

This feature allows the handling of heavy castings and eliminates the necessity of an extra wide bed to prevent saddle deflection. With the bed as designed on this machine the operator is not required to make set-ups or to operate the machine from unusual or awkward positions.

G&L FEATURES THAT HELP INCREASE PROFITS

- 36 Spindle speeds to each spindle
- 18 boring and drilling feeds to each spindle
- Two spindle design
- Directional Control
- Independent operation of Units
- Depth gauge and automatic trip
- Rotary feed and Speed selectors
- Direct reading dials
- Ratchet tooth safety trip for both spindles

SEE A G&L REPRESENTATIVE WHO WILL MAKE RECOMMENDATIONS OF THE PROPER TYPE MACHINE FOR YOUR PROBLEM

Machines built in Table, Floor, Planer, and Multiple Head Types with main spindle diameters ranging from 3" to 8" inclusive.

TABLE TYPE MACHINE: Either standard design or with special adaptation of machine with extra long cross travel when carrying heavy castings. (See 350-T above)

MULTIPLE HEAD MACHINE: These machines can be furnished with two, three and four vertical and horizontal heads.

PLANER TYPE MACHINE: Horizontal Boring, Drilling and Milling Machine of the Planer type with adjustable column. With large planer table, it is ideal for machining large Diesel engine frames.

FLOOR TYPE MACHINE: Obtainable with conventional type head or with bore spindle sliding in an adjustable quill. The adjustable quill is a big advantage on floor type machines for setting large milling cutters.

(Special attachments and fixtures can be provided for complicated machining operations.)

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

HORIZONTAL
★ BORING
★ DRILLING
★ MILLING
MACHINES

THE MORE G & L USERS THE MORE G & L BOOSTERS

BALL BEARINGS *Split for easy assembly*

Phantom photograph illustrates Split ball bearings on the connecting rod throws of a crankshaft. The Split ball bearing in the upper position is shown with the screws loosened and the halves separated while the Split roller bearing in the lower position is assembled in place.

Many applications involving radial or thrust loads—hitherto impractical or impossible—can now be handled through the DIVISIBLE assembly feature of SPLIT ball bearings. As a means of simplifying your designs and improving the performance of your equipment, it will be to your advantage to investigate these new bearings NOW.

SEND FOR CATALOG No. 82

SPLIT BALLBEARING CORPORATION

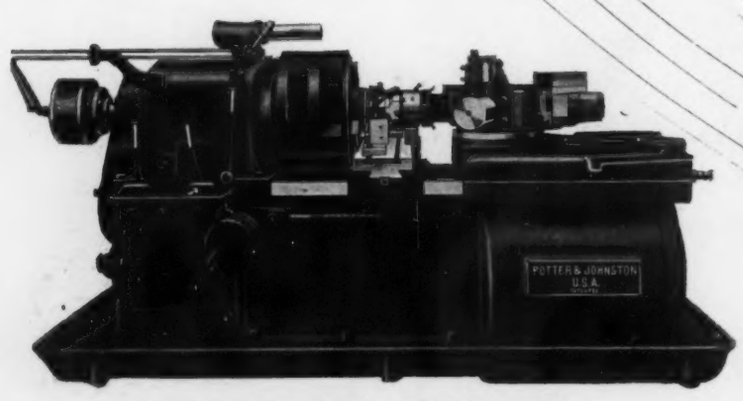
LEBANON, NEW HAMPSHIRE, U. S. A.

POTTER & JOHNSTON

in the

The Potter & Johnston Machine Company, pioneer manufacturers of Automatic Chucking Machines, through the combination of advance machine and tool design, plus cooperation with the countries leading production executives, have achieved astounding results in the principal manufacturing plants throughout the world.

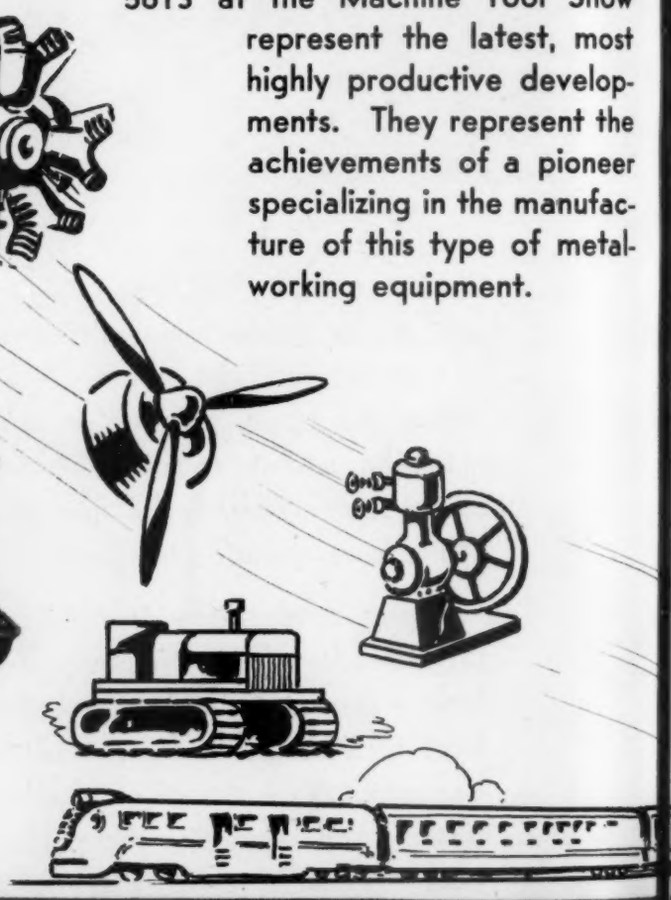
The Potter & Johnston Chucking Machines exhibited in Booth No. 5613 at the Machine Tool Show represent the latest, most highly productive developments. They represent the achievements of a pioneer specializing in the manufacture of this type of metal-working equipment.



5D POWER-FLEX AUTOMATIC

While standard in general design for several years, this machine has been constantly improved in construction details so that its productivity is governed only by the limitations of the cutting tools. When you see this machine at Cleveland, note the ease of set-up and the features which contribute to low cost maintenance.

This unit is an automatic chucking type equipped with a turret.



POTTER & JOHNSTON

PAWTUCKET, RHODE ISLAND

FACTORY REPRESENTATIVES: William L. Martin, headquarters at Factory; New England States and Eastern New York and New Jersey; A. W. Stone, 918 Kenyon Ave., Plainfield, N. J.; Western New York and New Jersey, Eastern Pennsylvania, Maryland and Delaware; G. Tull Dallam, 8-134 General Motors Building, Detroit, Michigan; Michigan and the City of Toledo, Ohio; Louis K. Veith, 14014 Woodworth Road, East Cleveland, Ohio; Ohio—with the exception of Toledo, and Western Pennsylvania; Harry I. Schuster, 745 N. Fourth St., Milwaukee, Wisconsin; Illinois, Missouri, Wisconsin, Iowa and Indiana.

AUTOMATICS

Metal Working Industries

For All Classes of Work

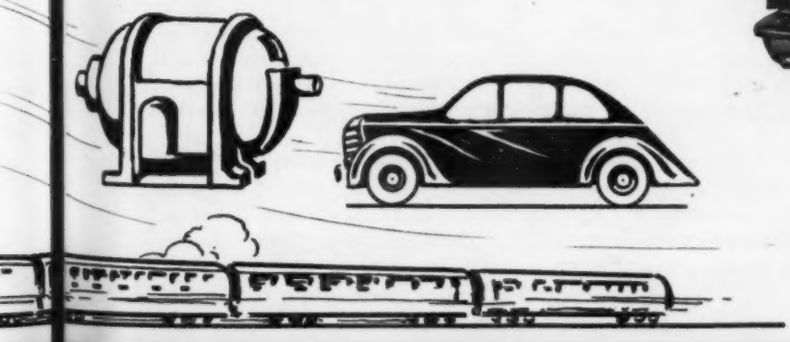
Used in these Industries

- Aircraft Engines
- Aircraft Propellers
- Automobiles
- Electric Motors & Controls
- Tractors
- Marine Engines
- Industrial Engines
- Rail Power Plants
- Trailers
- Textile Machinery
- Machine Tools
- Electric Tools
- Pneumatic Tools
- Oil Well Tools
- Air Compressors
- Road Working Machinery
- Mining Machinery

. . . and many other industries

You will have an opportunity to see these machines in operation, equipped with special and standard tooling and demonstrating the application of the many exclusive features to the production of parts familiar to most production executives.

Potter & Johnston representatives will gladly put these machines through their paces for you.



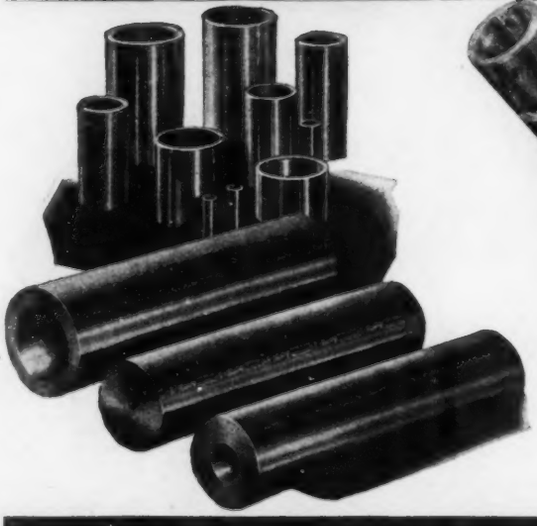
5D-2-9" POWER-FLEX AUTOMATIC
(Two Spindle Model)

A *brand new unit* of the two spindle chucking type with turret and cross slide. It is a smaller edition of the now well known P & J 5D-2-12" and 15" Automatics. The special tool equipment on this machine will be of special interest because it clearly demonstrates the versatility of this new member of the Potter & Johnston group of Automatic Chuckers.

MACHINE COMPANY

AGENCIES: Star Machinery Company, 1761 First St., South, Seattle, Washington; Hensel-Morgan Machinery Co., 2025 Santa Fe Ave., Los Angeles, Calif.; Jenison Machinery Co., 10th and Tennessee Sts., San Francisco; Wennesdorf, Helms & Co., Inc., 320 Franklin Ave., Houston, Tex.; Arthur Jackson Machine Tool Co., 60 Front St., West, Toronto 2, Ontario; Arthur Jackson Machine Tool Co., 437 Grosvenor Ave., Montreal, Canada; Burton Griffiths & Co., Ltd., Birmingham, England; R. S. Stokvis et Fils, Paris, France; Rotterdam, Holland and Brussels, Belgium; Maschinenimport Kackstat, Stockholm 1, Sweden; Ing. Ernste Vegni, Milano, Italy; Yamataka & Co., Ltd., Tokio, Japan; Oriental Export Co., 44 Whitehall St., New York, N. Y.; Almanco, Zurich, Switzerland; Hertz-Ila, Warsaw, Poland; Schmiedt et Schutte, Budapest, Hungary; Bourla Freres, Istanbul, Turkey.

THESE *Better Bearings* CONSERVE INDUSTRY'S POWER



● More power gets to the job when the electric motor turns on Bunting Bearings because of inherent exclusive anti-friction properties in the bearing metal. Made to the motor manufacturer's original designs. Available from stock for all makes of motors from 1/50 HP to 100 HP. Write for catalog.

Bunting's Standardized Bronze Bearings for all mechanical applications and Bunting Precision Machined Bronze Bars afford low cost high quality bearings for all equipment and maintenance needs. Leading wholesalers have stocks . . . 52-page catalog on request.

The Bunting Brass & Bronze Company, Toledo, Ohio.
Warehouses in All Principal Cities.

BUNTING

BRONZE BUSHINGS
PRECISION BRONZE BARS

BEARINGS
BABBITT METALS

FOR TOOLS THAT CAN "TAKE IT"

LATROBE

HIGH SPEED STEELS

The many metallurgical processes LATROBE employs in making ELECTRITE High Speed Steels are marked by an accuracy of *control* at every step! • During the melting and refining in electric furnaces the closest possible supervision is exercised. The forging, rolling, annealing and heat-treating operations are carried on through the use of gas furnaces of the latest design, atmospherically controlled! • This *rigid control* in every phase of manufacture is one of the reasons why LATROBE ELECTRITE is synonymous with *high quality* in high-speed steels.

HIGH SPEED STEELS
for every need

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Latrobe ELECTRIC STEEL COMPANY

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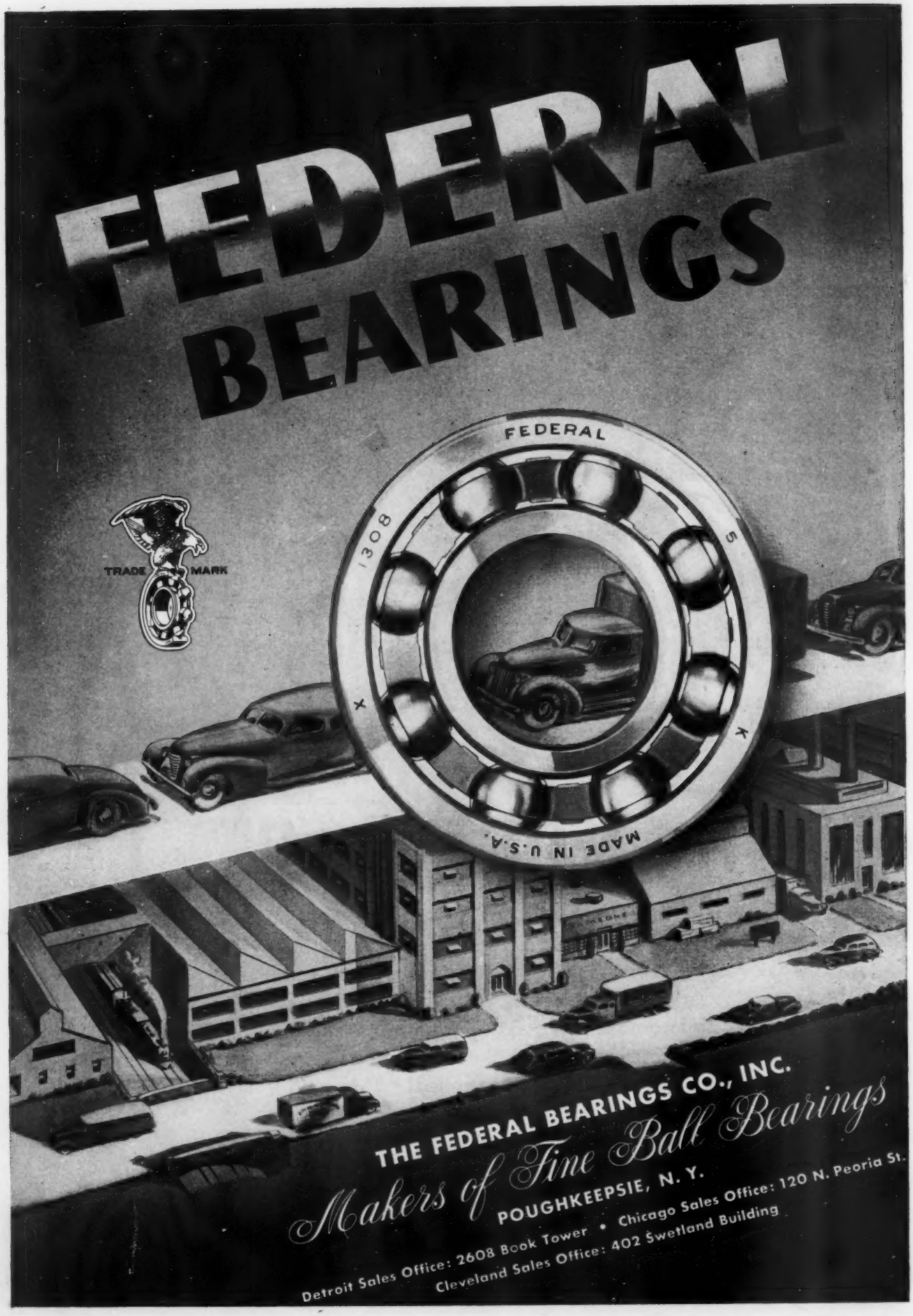
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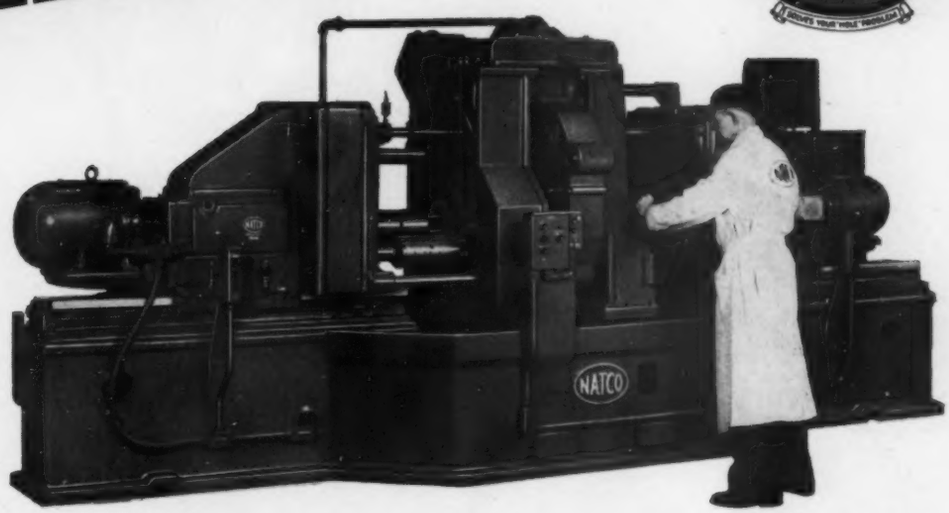
COMBINE OPERATIONS

Use a NATCO and Reduce Costs

Drilling
Hollowmilling
Chamfering
Counterboring
Facing



NATCO Advanced Engineering
Plus Quality Construction
Recognized For Many Years
The World Over

Located in one of the country's automotive transmission plants, this NATCO two-way trunnion type machine is performing a total of fourteen drilling, hollowmilling, chamfering, counterboring, and facing operations on 100 "transmission main shafts" per hour.

It is built of two NATCO HOLEUNITS complete with spindle boxes containing a total of 8 heavy duty spindles complete with nose adjustment. Mounted between the heads is a 5-position power indexed trunnion type fixture arranged to hold one part in each position.

This is another example of lowering production costs by combining operations on NATCO way-type machines . . . for they are designed for production work . . . and are sturdily built to stand up against hard usage over long periods with little maintenance expense.

Write for literature or call a NATCO representative to work with your engineers for a practical and economical solution of your machining problems.

THE NATIONAL AUTOMATIC TOOL CO.
Richmond, Indiana, U. S. A.

Chicago Office, 2009 Engineering Bldg.
Detroit Office, 409 New Center Bldg.

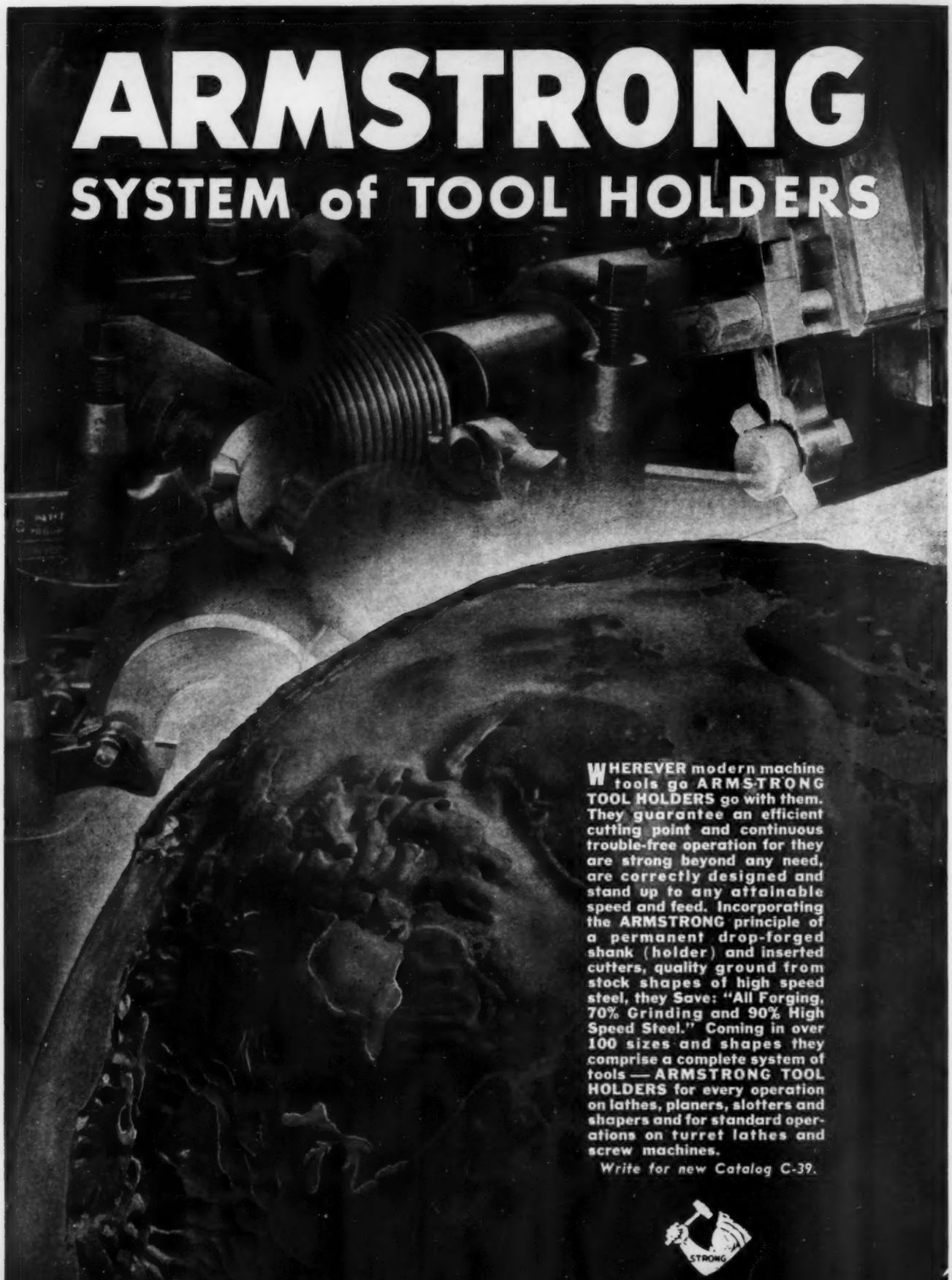
Investigate NATCO Methods for the Lowest Possible Hole Costs!

NATCO

DRILLING, BORING and TAPPING MACHINES

SOLVES YOUR "HOLE" PROBLEM

ARMSTRONG
SYSTEM of TOOL HOLDERS



WHEREVER modern machine tools go **ARMSTRONG TOOL HOLDERS** go with them. They guarantee an efficient cutting point and continuous trouble-free operation for they are strong beyond any need, are correctly designed and stand up to any attainable speed and feed. Incorporating the **ARMSTRONG** principle of a permanent drop-forged shank (holder) and inserted cutters, quality ground from stock shapes of high speed steel, they Save: "All Forging, 70% Grinding and 90% High Speed Steel." Coming in over 100 sizes and shapes they comprise a complete system of tools — **ARMSTRONG TOOL HOLDERS** for every operation on lathes, planers, slotters and shapers and for standard operations on turret lathes and screw machines.

Write for new Catalog C-39.

ARMSTRONG BROS. TOOL CO., *"The Tool Holder People,"* **CHICAGO, U. S. A.**

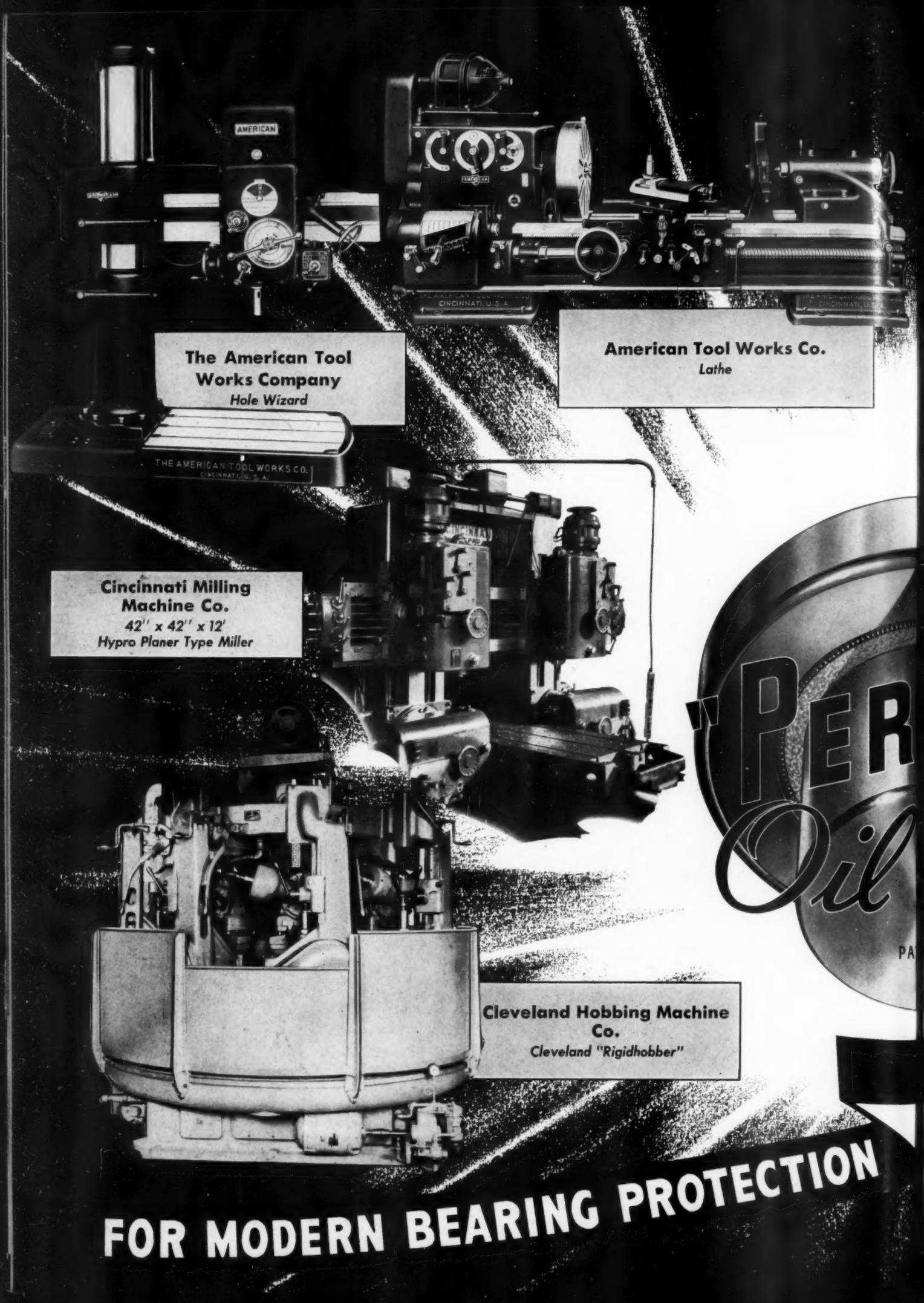
MODERN MACHINE TOOLS REQUIRE AND ARE PROTECTED BY

CHICAGO RAWHIDE OIL SEALS

Chicago Rawhide Oil Seals perform a dual function. They keep lubricant in the bearing and they keep dust, moisture and foreign matter out. They are small, compact, self-contained—easy to apply—need no further attention after installation. They are inexpensive and applicable to all types of machines.

On the following pages are illustrated a few of the Modern Machine Tools which were to have been exhibited at the Cleveland Show, and which are equipped with . .

CHICAGO RAWHIDE OIL SEALS


AMERICAN
CINCINNATI, U. S. A.
The American Tool Works Company
Hole Wizard
THE AMERICAN TOOL WORKS CO.
American Tool Works Co.
Lathe
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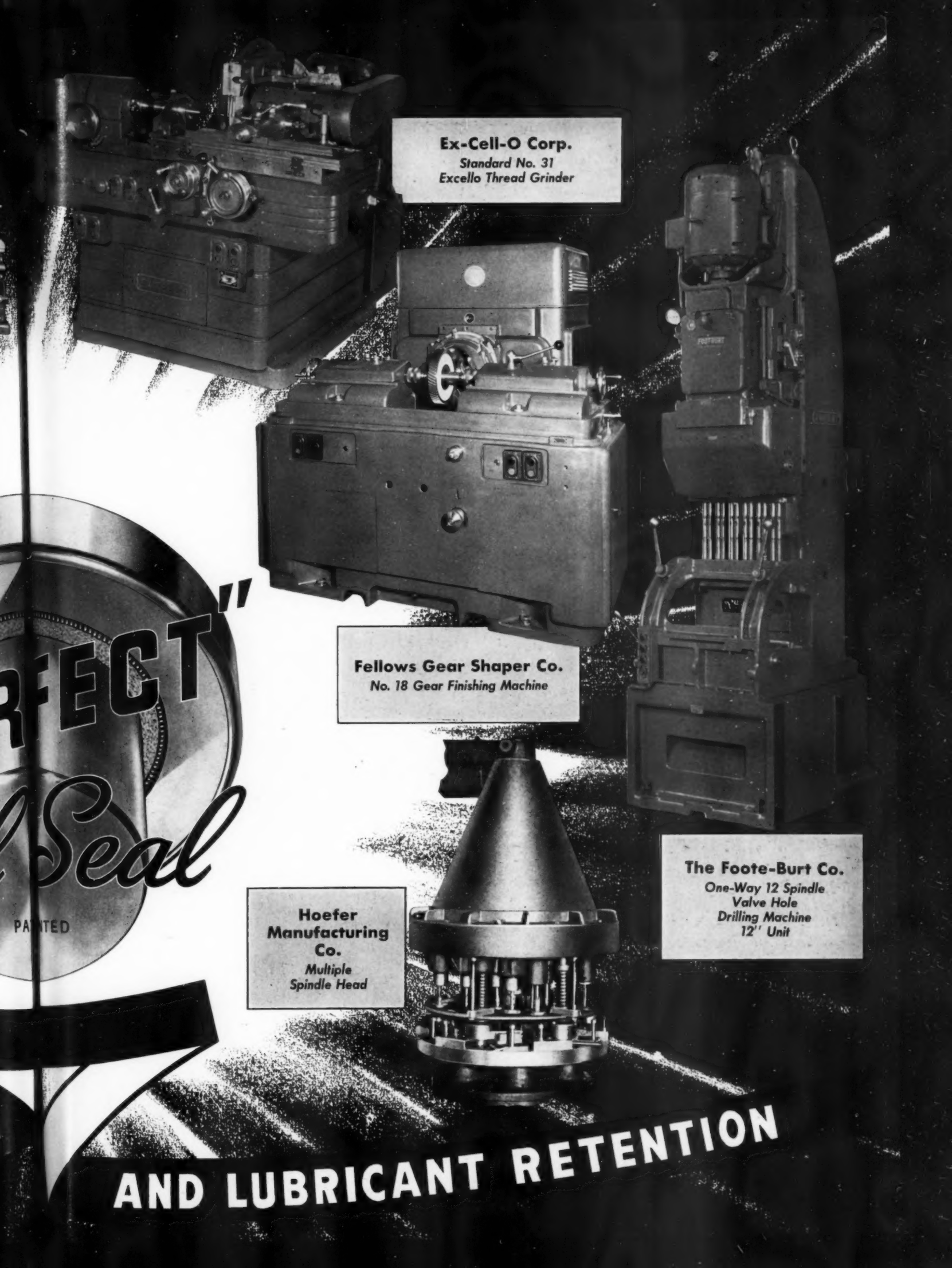
42" x 42" x 12'
Hypro Planer Type Miller
Cleveland Hobbing Machine Co.
Cleveland "Rigidhobber"
FOR MODERN BEARING PROTECTION


Ex-Cell-O Corp.
Standard No. 31
Excello Thread Grinder
Fellows Gear Shaper Co.
No. 18 Gear Finishing Machine
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Drilling Machine
12" Unit
Hoefer
Manufacturing
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Multiple
Spindle Head
RFECT"
Seal
PATENTED
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Landis Tool Co.
No. 1 Race-A-Way Grinder

Landis Tool Co.
4-Spindle Semi-Automatic Threading Machin

Sunstrand Machine Tool Co.
No. 0 Rijidmil

William Sellers & Co.
No. 6-HF 6" Horizontal Boring, Drilling and Milling Machine

CHICAGO RAWHIDE MANUFACTURING CO.

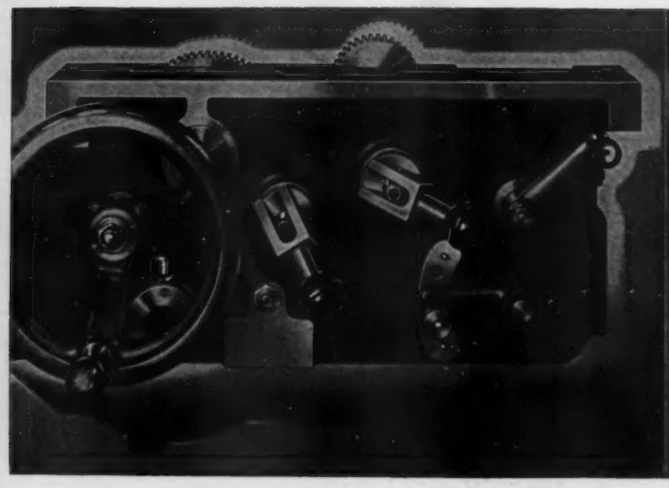
1292 ELSTON AVENUE • CHICAGO, ILLINOIS

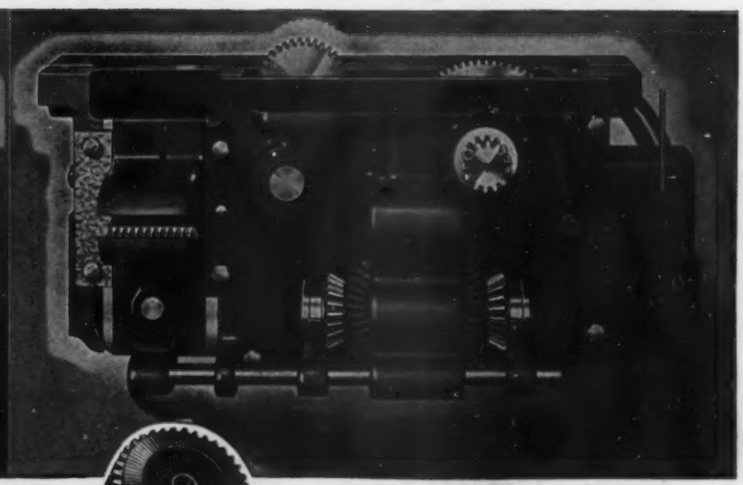
60 Years Manufacturing Quality Mechanical Leather Goods Exclusively

PHILADELPHIA • CLEVELAND • NEW YORK • DETROIT • BOSTON • PITTSBURGH • CINCINNATI

Some revealing details concerning . . .

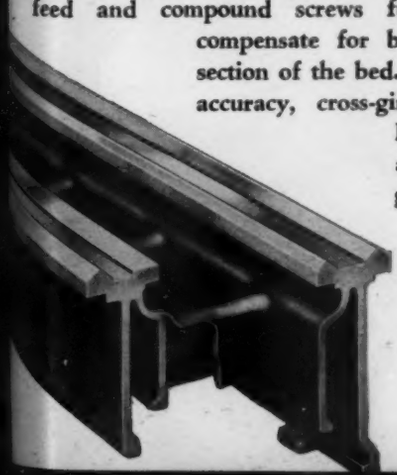
SIDNEY LATHES





—14" to 36" swing—backed by sound engineering practice. Above are two detail photos of the double wall apron which supplies outer supports for shafts mounted on anti-friction bearings Gears and shafts of heat-treated steel, automatically lubricated. In the lower right hand corner is a photo of the carriage and the compound rest provided with tapered gibs to compensate for wear. (Note extra center gib.) Neoprene wipers mounted under compression to hold oil under carriage and protect the bed way. Large micrometer dials and stop for adjustable depth control (applicable to external and internal threading). Cross feed and compound screws furnished with adjusting nuts to compensate for back-lash and wear. At left is a section of the bed. Note 4-wall design for permanent accuracy, cross-girths at 12" intervals. SIDNEY LATHES are herringbone geared and feature internal and external gear tooth clutches.

Full details in latest bulletin. Write.



SIDNEY
MACHINE TOOL COMPANY
SIDNEY, OHIO

THE BIRTH OF A BEARING

FAFNIR

The father of a few children who amount to something has done mankind a greater service than the father of thirteen, if he aims most of his brood toward reform school.

It's the same way with ball bearings. An over-zealous bearing manufacturer, at the whims of an over-anxious bearing user, can produce a lot of unhappy "children". . . .

Bearings whose place in the world of industry is so limited that, from birth, they're headed for an early death or quick reform.

Fafnir measures completeness of line in *usefulness* rather than numbers alone. That is why the birth of a bearing is important at Fafnir, for each new arrival is destined for a key place in a big, healthy, successful family.

Glance at the Fafnir literature shown at the left. See how the Fafnir line—*the balanced line—most complete in America* — is divided. Not into thousands of individual designs of limited application, but into carefully-planned groups of bearings, each designed to serve a given industry — and serve it completely.

The Engineering Catalog covers the Fafnir standard line — complete in range of types and sizes — which eliminates in nine cases out of ten the cost, delay and grief that goes with designing a special bearing. And Fafnir's specialized lines, proved in performance, provide bearings ready to go to work in specialized applications — and to deliver.

It takes only a few seconds now to get acquainted with these Fafnirs. Select, on the opposite page, the descriptive literature you want, and write to the Fafnir Bearing Company, New Britain, Connecticut.

BALANCE IN DESIGN

In ball bearing design, ball size, race depth and ring thickness determine life and capacity.

Fafnir's larger balls carry greater load; make fewer revolutions per bearing revolution, with resultant longer life. Fafnir's deeper races also increase load capacity, and provide thrust capacity to a degree unusual in a radial bearing.

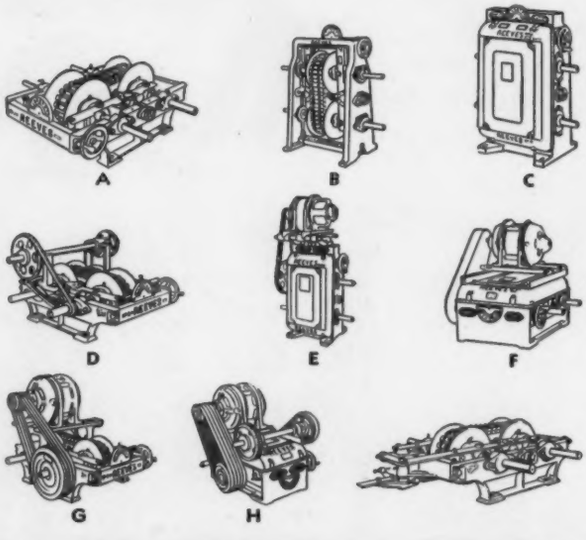
Every Fafnir Ball Bearing has been developed to the point where high capacity and long life are inherent attributes of a perfectly balanced design.

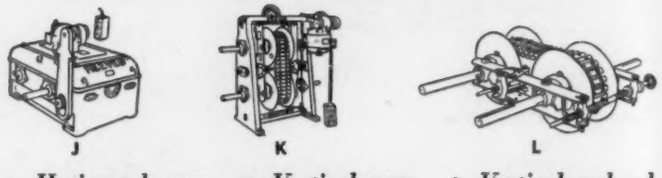
SPEED CONTROL

THERE undoubtedly are machines in your plant which variable speed control would make more productive, more versatile for different kinds of work, better able to turn out higher quality. Have you thought it would require too much expense and trouble to adapt a standard speed control unit to them? *Then note carefully the wide variety of* REEVES *Speed Control units and adaptations shown in these pages.* The chances are that REEVES engineers have worked out the exact adaptations and applications you need, and the installations will be far more simple and inexpensive than you have suspected. The examples shown are but a few of the scores of units, mountings, and controls available—each of which has been thoroughly tested and proved in service. Only REEVES gives you positive and accurate control in the size and type of unit you need, at a price that will fit your budget. Send photograph or blue print of machine for specific recommendation. No obligation.

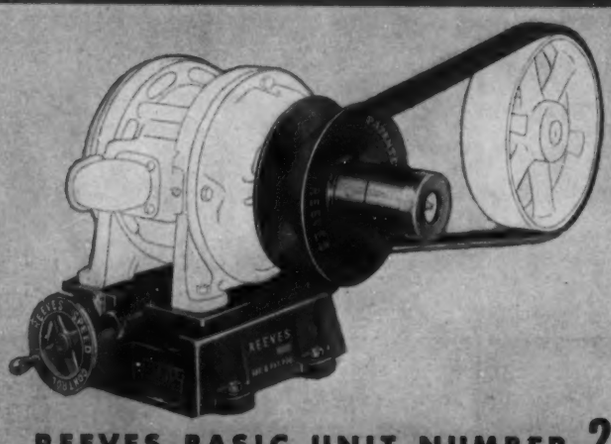
REEVES BASIC UNIT NUMBER 1

—Variable Speed Transmission . . . Provides infinite speed adjustability over wide range. Accurate and positive at all speeds. Modern, compact open and enclosed designs, vertical and horizontal. Thirteen sizes—fractional to 75 h.p. Speed variations from 2:1 to 16:1 inclusive.



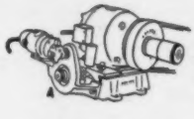


A. *Horizontal open.* B. *Vertical open.* C. *Vertical enclosed.* D. *Horizontal open, countershaft unit.* E. *Vertical enclosed with motor.* F. *Horizontal enclosed with motor.* G. *Horizontal open with motor.* H. *Horizontal enclosed design with motor drive and countershaft.* I. *Horizontal open with mechanical automatic control.* J. *Horizontal enclosed with electric remote control.* K. *Vertical open with electric remote control.* L. *Internal operating parts (for incorporation into driven machine).*



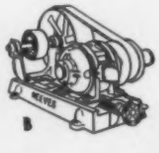
REEVES BASIC UNIT NUMBER 2

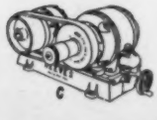
—Vari-Speed Motor Pulley . . . Simplified development of transmission. Mounts on standard shaft of any constant speed motor. Forms actual drive to machine. Sliding motor base is moved forward or back for speed changes. Ten sizes—fractional to



A. *Vari-Speed Motor Pulley with push button type electric remote control.*

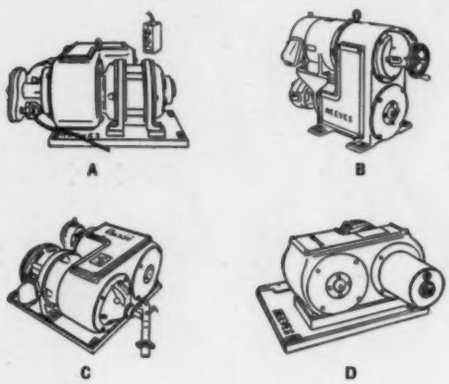
B. *Vari-Speed Motor Pulley countershaft unit for unusual speed reduction or speed increase.*



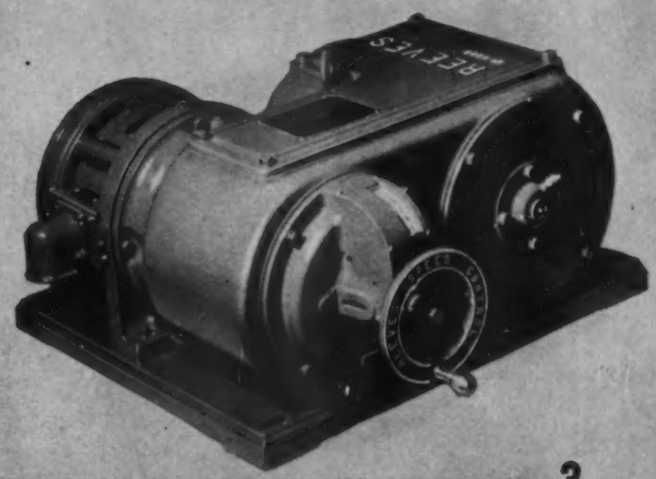


C. *Vari-Speed Motor Pulley with speed reducer mounted on common base.*

for machines in service made EASY by REEVES...



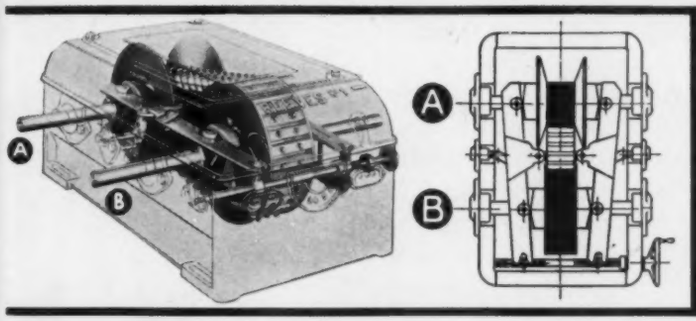
A. *Horizontal with electric remote control.* B. *Vertical design unit.* C. *Horizontal with mechanical automatic control.* D. *Horizontal with fluid pressure type automatic control.*



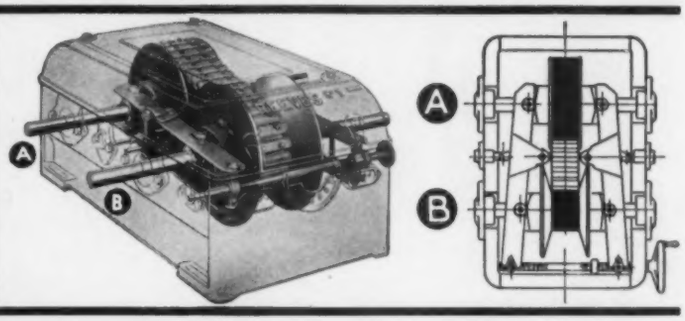
REEVES BASIC UNIT NUMBER 3

—Motodrive . . . Combines in one compact, self-contained enclosure, constant speed motor, REEVES speed varying mechanism and reduction gears (where required). Available in space-saving horizontal and vertical types—¼ to 10 h.p. Speed variations 2:1 to 6:1 inclusive.

REEVES Time-Tested Operating Principle Insures Positive, Accurate Speed Adjustability



MINIMUM SPEED—On constant speed shaft "A," discs and speed-changing levers are farthest apart while the V-belt runs at the smallest diameter between the discs. On the variable speed shaft "B" the reverse is true and this shaft operates at minimum speed.



MAXIMUM SPEED—On constant speed shaft "A," discs and speed-changing levers are closest together while the V-belt runs at largest diameter of the discs. On variable speed shaft "B" conditions are reversed and this shaft runs at maximum speed.

The new REEVES 122-page catalog G-397 should be in every Production Manager's files. Recently revised. Profusely illustrated with installation views. Mailed *to executives and engineers upon request.*

REEVES PULLEY COMPANY, *Dept. A*, COLUMBUS, INDIANA

REEVES SPEED CONTROL

Neloy flame hardened industrial Gears and Track wheels

Note the discoloration on the flame-hardened surfaces of the gears shown above . . . An unretouched photograph.

You have at your command, when you do business with National-Erie, a wide range of gear cutting equipment for the production of spur, bevel, mitre, Sykes continuous Herringbone gears . . . The complete facilities of modern machine shops manned by expert machinists . . . Moreover, you have heat-treating facilities for fully quenched gears, which together with electric and open-hearth furnace foundry facilities, permit complete control of the manufacture of the materials you order . . . As you note above, a typical group of diversified industrial Neloy gears and crane track wheels for Neloy Flame Hardening treatments No. 10A and No. 10B . . . Make your source of supply for special steel castings and finished parts for your equipment, the National-Erie Corporation . . . Bulletins No. 5 and No. 6 are worth having on file for constant reference . . . They are yours for the asking.

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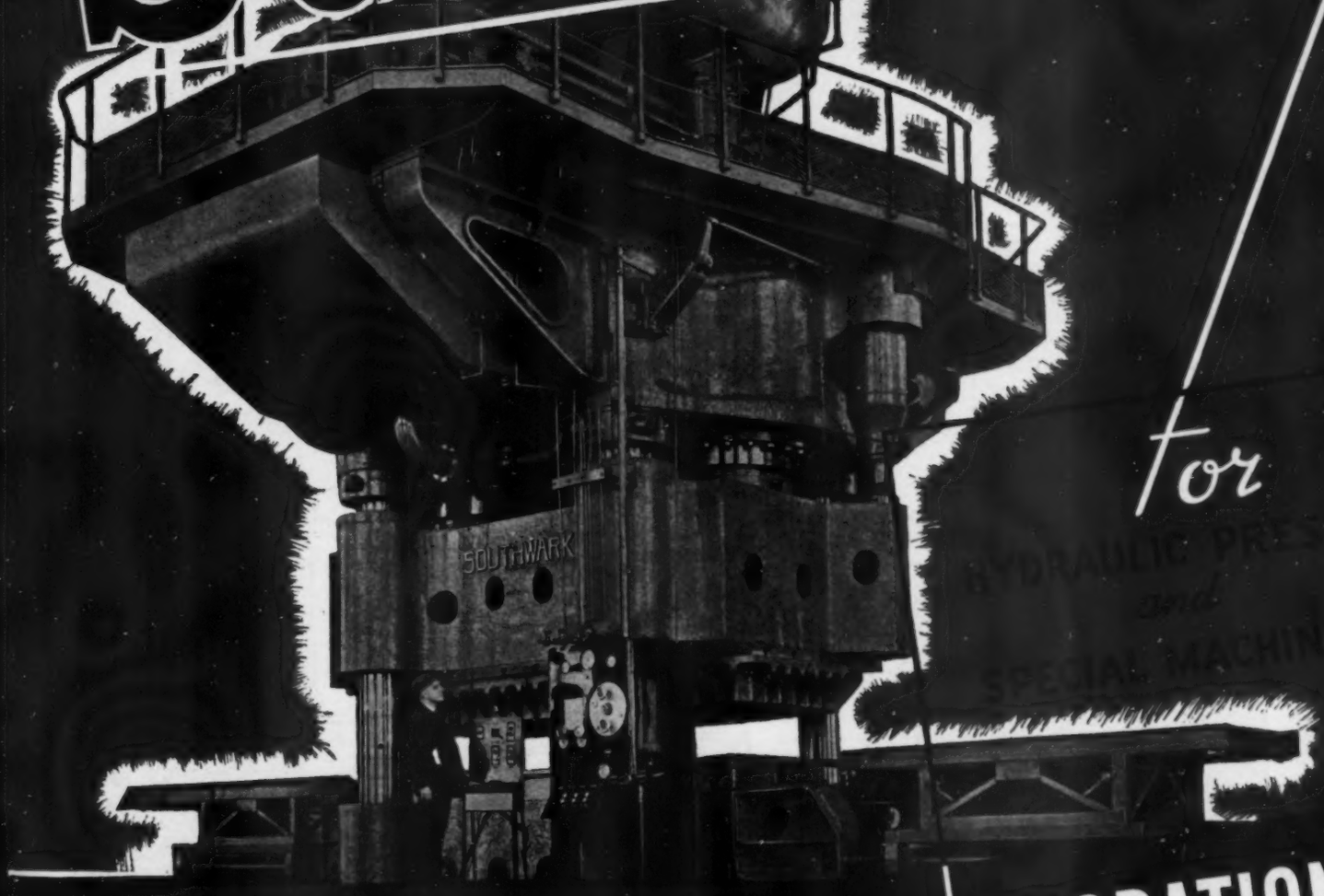

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OPERATING VALVES • HYDRAULIC PUMPS • ACCUMULATORS • PLATE PLANERS •
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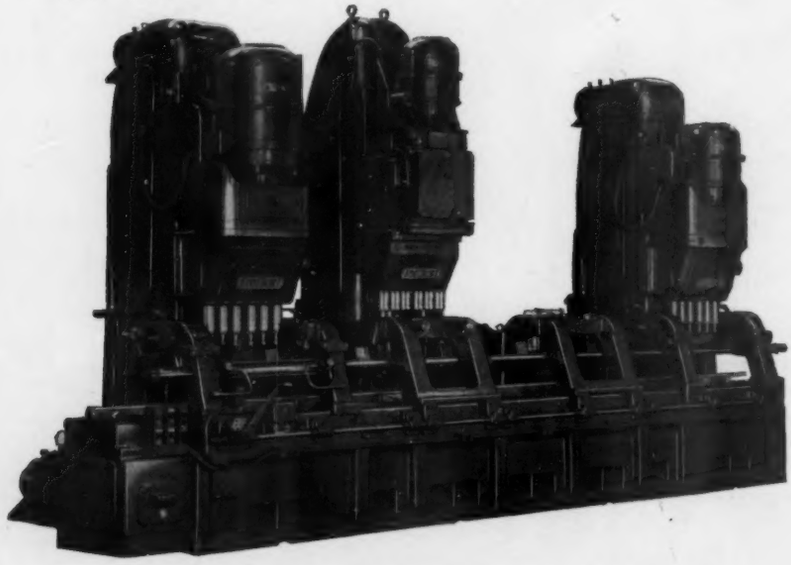
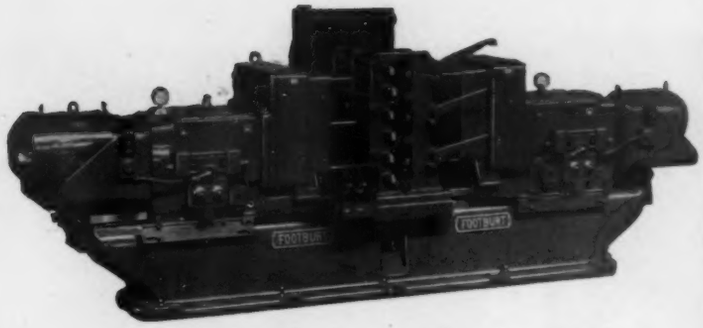
"FOOTBURT . . . A great line of machines designed to produce parts faster and more accurately. Why not send details of your machining problem? We will be glad to study it and make recommendations on the proper Footburt equipment to solve it."

SURFACE BROACHING MACHINES . . . single slide and duplex hydraulic — also horizontal continuous type furnished.



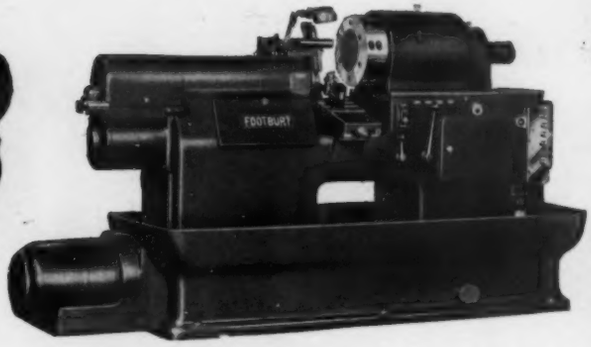
STATION TYPE MACHINE . . . handles a sequence of drilling, boring, reaming and tapping operations. Either hand, hydraulic or mechanically operated indexing.

FOOTBURT

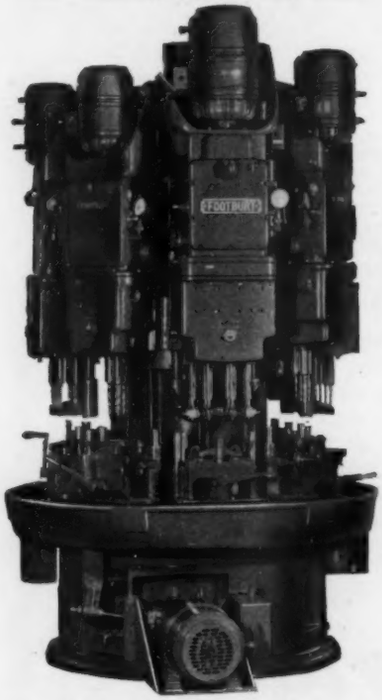


HYDRAULIC FEED WAY DRILLS . . . Two-way with three compartment fixture.

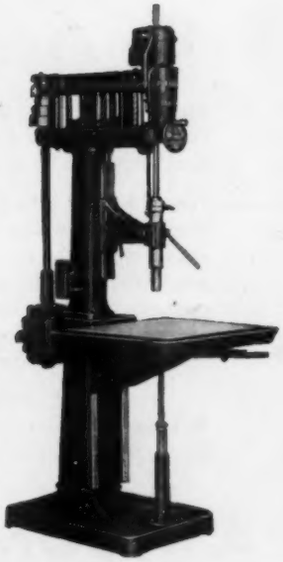
LEAD SCREW TAPPING MACHINES . . . Units may be mounted in any position and combined to operate simultaneously with drilling units.



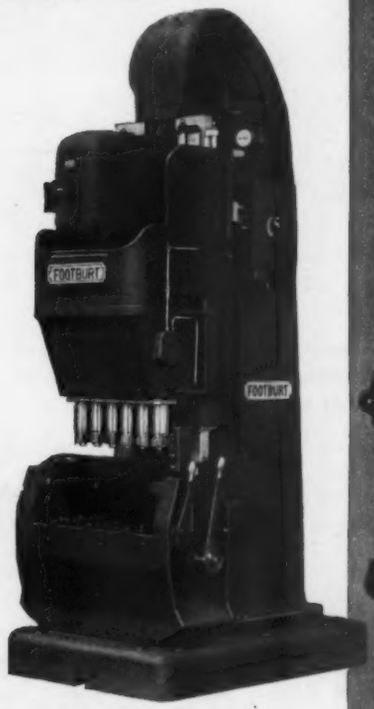
AUTOMATIC BAR MACHINE . . . hydraulically controlled with quick set-up and fast operation outstanding features.



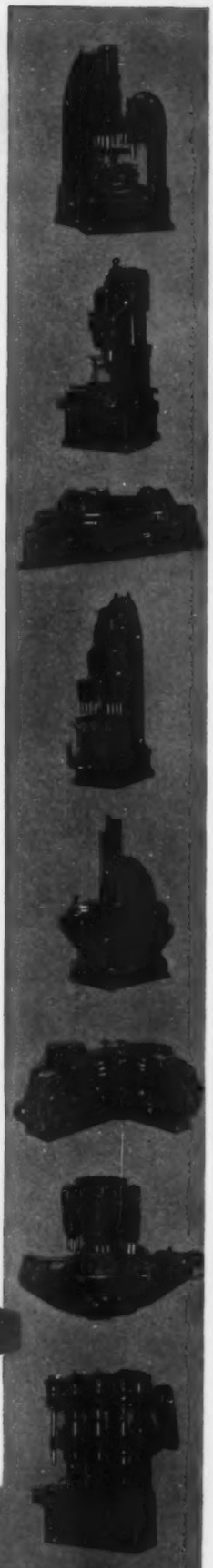
CENTER COLUMN STATION TYPE MACHINE . . . 7 units handling a sequence of operations.



SENSITIVE DRILLING MACHINE . . . A full range drill with back gear unit for s-l-o-w speeds.



CYLINDER BORING MACHINE . . . Stub type machine used by leading automobile manufacturers.



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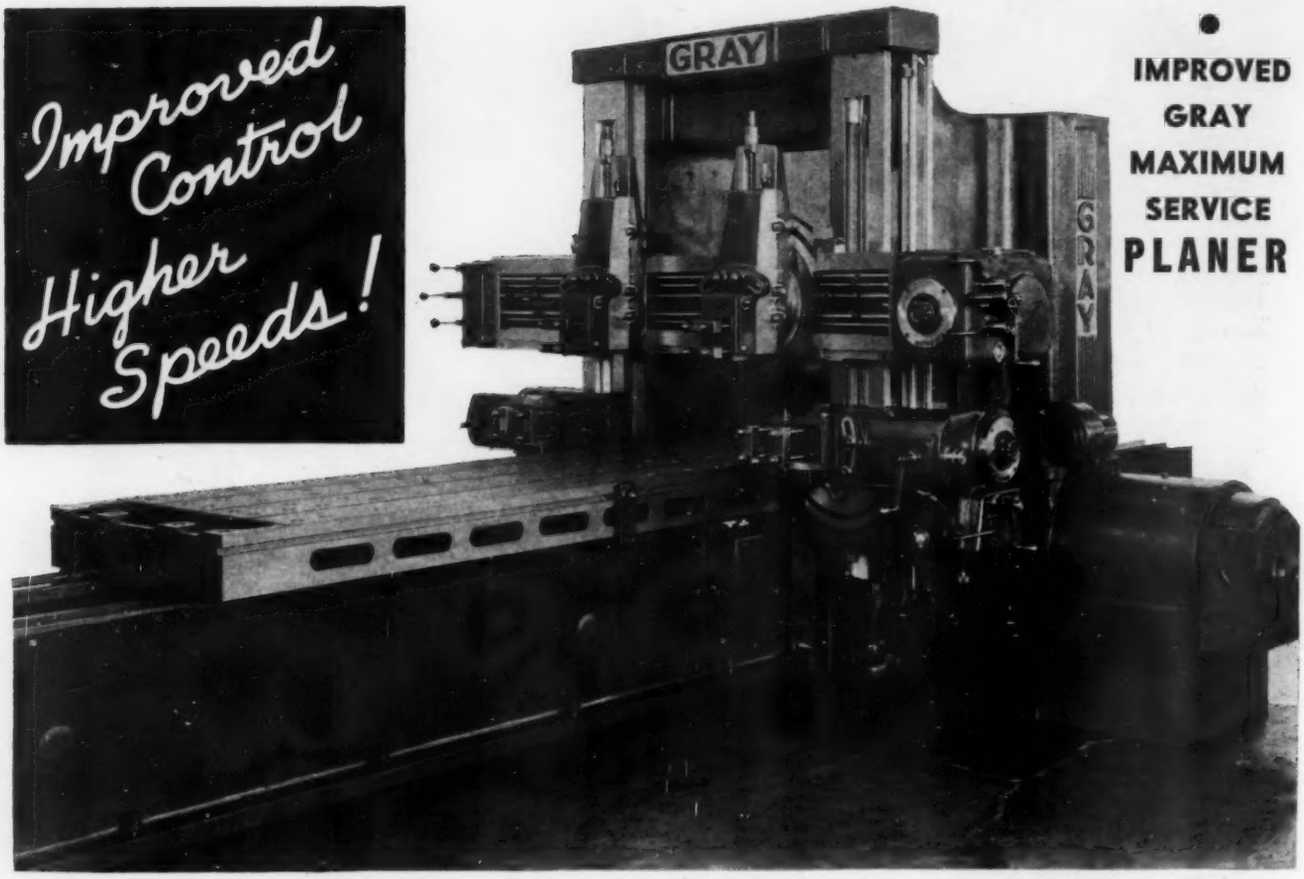


IMPROVED GRAY MAXIMUM SERVICE PLANER

GRAY BULLETIN:

BIG NEWS at the G. A. Gray Plant

The big news is the improvement in control and drive—the phenomenal speed of the improved Gray Maximum Service Planer.

It's NEWS when you see control levers for feed and rapid traverse located at the heads themselves, as well as at both ends of the rail.

It's NEWS when you find a planer with all rail elevating and rapid traverse parts on the top brace fully enclosed—with gears running in an oil bath and a one-shot oiler at the operator's fingertips.

It's NEWS when you have a planer structure that is so well built it eliminates counterweight braces, cables and weights, and stiffens the housing in both directions (particularly important when you're doing heavy roughing on high work!).

The all-helical 5 to 1 gear train is *news*, too, in the way it develops to the fullest extent rapidity of reversal made possible by the variable voltage drives now available. Cutting and return speeds from 8 to 240 ft. per minute! As many as 50 round trips per minute of the table can be made without shock or knock at moments of reversal.

Get the details of the big news! We will be pleased to supply them. Convince yourself of the astonishing production possibilities of this new planer.

THE G. A. GRAY COMPANY

3611 WOODBURN AVE., CINCINNATI, OHIO

Producers of the New

Improved **GRAY MAXIMUM SERVICE PLANER**

SPEEDY—ECONOMICAL—SIMPLE

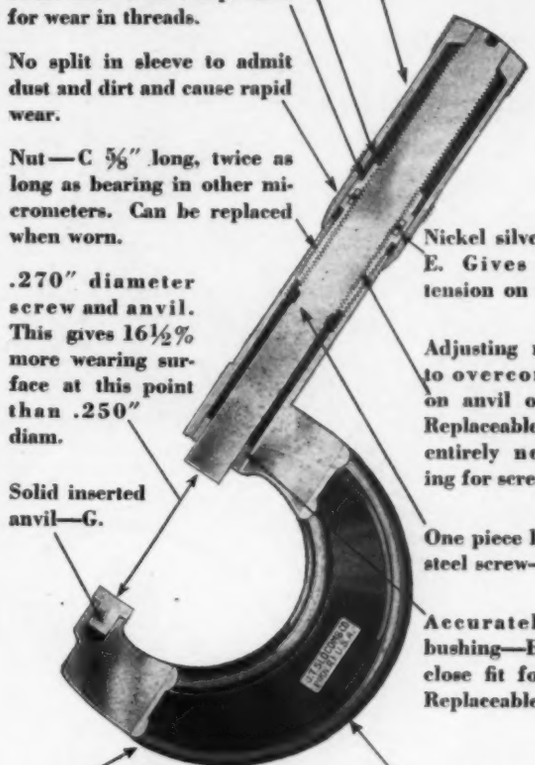
SLOCOMB PRECISION INSTRUMENTS

The Modern way to check close tolerances

Responsibility for accuracy—in the toolroom on the production line—in inspection departments—in modern shops the world over—rests on the dependable precision of Slocomb Micrometer Calipers.

These accurate, long-lived instruments have nearly half a century of Slocomb's specialized experience behind them.

By devoting attention to the manufacture of MICROMETER CALIPERS, CENTER DRILLS, and COMBINATION DRILLS and COUNTERSINKS exclusively, Slocomb has been able and successful in making every tool as nearly perfect as it is possible to make it and at the same time insure utmost quality and service.


Arrangement of nuts insuring long bearing in spite of wear.
Short nut—D to compensate for wear in threads.
No split in sleeve to admit dust and dirt and cause rapid wear.
Nut—C 5/8" long, twice as long as bearing in other micrometers. Can be replaced when worn.
.270" diameter screw and anvil. This gives 16½% more wearing surface at this point than .250" diam.
Solid inserted anvil—G.
I section frame—B drop forged from bar steel.
Decimal equivalents stamped on thimble.
F—Thimble.
Nickel silver spring E. Gives uniform tension on screw.
Adjusting nut—C to overcome wear on anvil or screw. Replaceable, giving entirely new bearing for screw.
One piece hard tool steel screw—A.
Accurately fitting bushing—H insures close fit for screw. Replaceable.
Black enameled or polished frame.

SLOCOMB MICROMETER CALIPERS

are made in types to meet every modern requirement and in sizes to measure from 0 to 60".

SLOCOMB SNAP GAUGE MICROMETERS

Designed primarily for inspection and production work, these instruments eliminate the necessity of having to use a variety of snap gauges. Made in several sizes from 0-1" to 5-6" and in metric graduations from 0-25 mm. to 125-150 mm.

CENTER DRILLS

Available in either carbon or high speed steel in Center Drill, Combination Center Drill and Bell Type Center Drill types. Combination Center Drills and Bell Type made in ⅛ to ¾ inch sizes; Center Drills from ⅛ to 1 inch.

Send for 112-page Catalog No. 18 describing the full Slocomb line in detail.

J. T. SLOCOMB CO., PROVIDENCE, RHODE ISLAND

HARDINGE HIGH SPEED PRECISION SCREW CUTTING LATHE

A MODERN screw cutting pedestal lathe, 9" swing, 1" collet capacity, sixteen spindle speeds forward and reverse from 27 to 1750 RPM.

Over fifty years experience in manufacturing accurate, high speed tool room machines is embodied in this lathe. Extreme accuracy, high spindle speeds and thread cutting ability are coupled with power and convenience of operation to rapidly obtain desired results.

Precision

HARDINGE HIGH SPEED PRECISION MILLING MACHINE

PEDESTAL type with 1" collet capacity, eight spindle speeds forward and reverse, 110 to 1850 RPM.

This Precision Milling Machine was designed to meet a definite need in the tool room and laboratory. The construction, along modern lines, combines ruggedness with extreme accuracy for ease of operation. Reflection will indicate that larger milling machines are expensive and cumbersome for the majority of milling operations completed in the tool room and laboratory.

HARDINGE BROTHERS . . . Inc.

Originators of Enclosed Head High

FOR PROFITS MACHINE TOOL SHOW
CLEVELAND
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SEE THESE HARDINGE *Cataract* MACHINES AT THE SHOW
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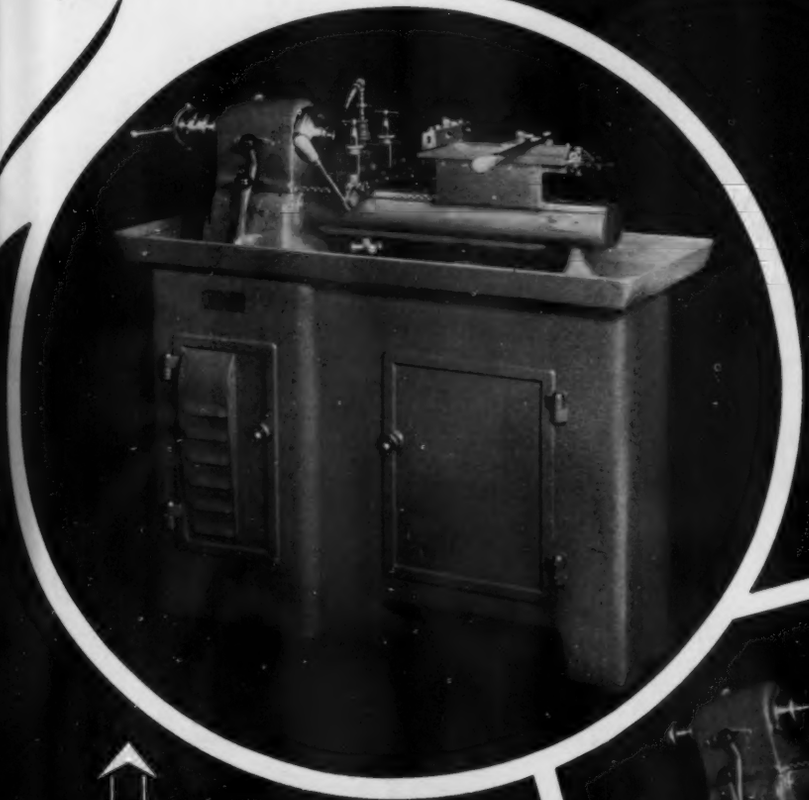
HIGH SPEED PRELOADED BALL BEARING MACHINE TOOLS



HARDINGE HIGH SPEED PRECISION LATHE

PEDESTAL type, 9" swing, 1" collet capacity, eight spindle speeds forward and reverse from 230 to 3900 RPM—also furnished with bench or cabinet mounting. These machines are being installed in ever increasing numbers because of their design, quality of workmanship, ease of operation, accuracy, durability and interchangeability of attachments. They have won recognition as being the best obtainable for production, tool room, laboratory and experimental purposes.

HARDINGE HIGH SPEED PRECISION SECOND OPERATION MACHINE

PEDESTAL type, 9" swing, 1" collet capacity, 6" step chuck capacity, 36" bed. Eight spindle speeds forward and reverse from 150 to 3900 RPM with complete oil equipment built into pedestal base.
This is the machine that increases quality production with accuracy, high speed and low cost. It is ideal for completing additional operations on parts as they come from automatic screw machines.

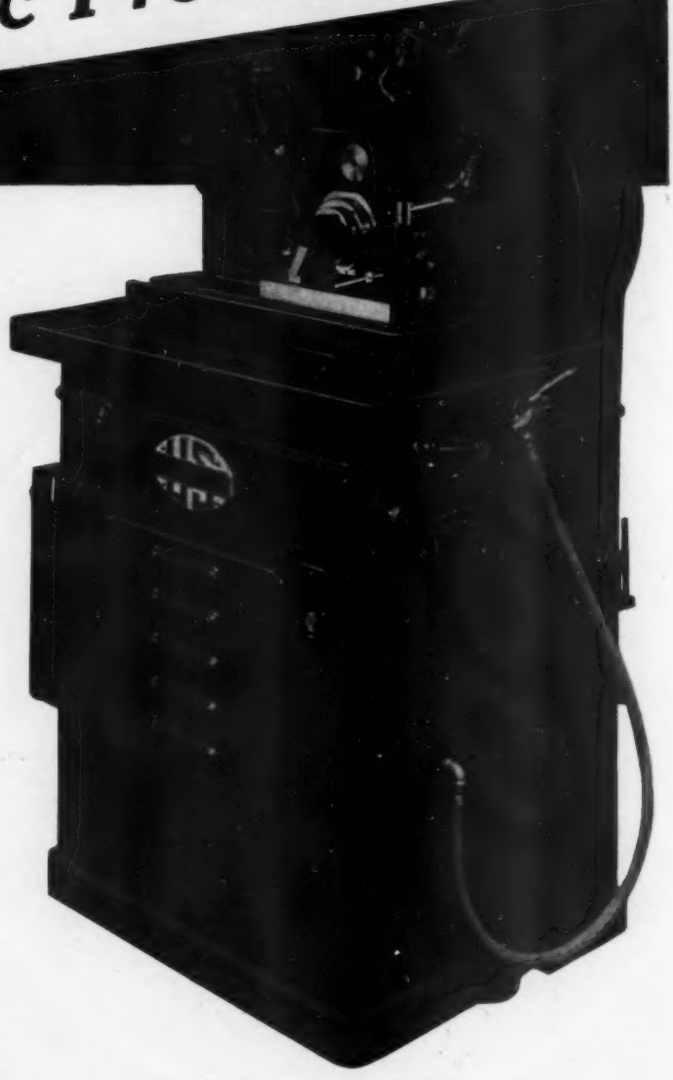
ELMIRA, NEW YORK

Speed Precision Lathes

An IMPORTANT New Feature

Automatic Profiling

with the new MM-52 MULTI-MILLER



Cam controlled vertical feed of the spindle head in addition to the standard cam controlled table feed make the new MM-52 Multi-Miller suitable for a wide range of profiling operations. This compact machine replaces larger hand profiling machines on such work as small arms, business machines, aircraft parts, and sewing machine parts. One operator can attend to a battery of machines—and these Multi-Millers are not limited just to profile milling. They are suited for conventional milling, climb milling, rotary milling, continuous milling and high speed grinding. Bulletin AM-36 gives full details—send for it.

TYPICAL CYCLE NO. 1

Here is an example of a typical application for the MM-52 Multi-Miller: The operator loads the part and starts the automatic cycle—fast advance to cutting position—mill at one level—then raise the spindle head automatically with the table at a standstill, thus milling vertically—resume table travel at cutting speed to complete the cut—raise the spindle to clear and then return table and spindle to loading position at fast speed.

TYPICAL CYCLE NO. 2

A typical profiling operation on the MM-52 Multi-Miller would call for the following cycle: The operator loads the part and starts the automatic cycle—fast advance to cutting position—cut at one level—continue cut on desired radius or contour by synchronized movement of table and spindle head—raise spindle to clear—quick return to loading position.

MM-52 U. S. MULTI-MILLER

- 6" automatic table feed
- 2" automatic vertical feed of spindle head
- 7¾" manual vertical adjustment of spindle head
- 1 Horsepower spindle drive motor
- Built-in coolant system
- Automatic lubrication system

Makers of
U.S. Multi-Millers
U.S. Multi-Slide Machines
U.S. Automatic Pressroom Equipment
U.S. Compound Wheel Truing Attachments
U.S. Die Sets

PRODUCTS

U.S. TOOL COMPANY, INC.
AMPERE, (EAST ORANGE,) N. J., U.S.A.

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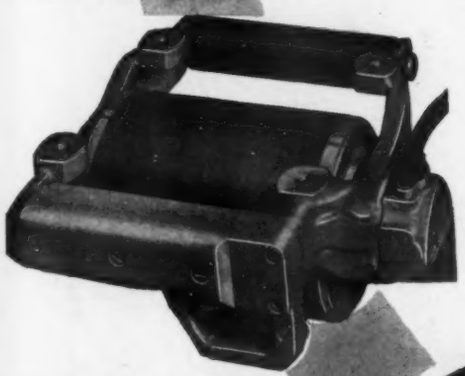
WALKER MAGNETIC CHUCKS and GRINDERS will save you money IN YOUR SHOP

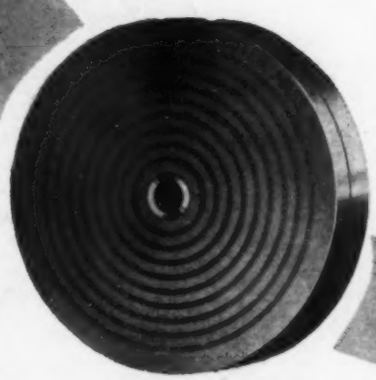
No. 618 Walker Magnetic Chuck—a rectangular type available in a wide range of sizes up to 20" x 96".

No. 617 Bar Pole Face Rectangular Walker Magnetic Chuck — designed especially for holding small and thin work.

Walker Universal Swivelling Magnetic Chuck. These chucks can be arranged with Vernier adjustment.



Walker Portable Type Alternating Current Demagnetizer adapted for quick and effective removal of residual magnetism by rolling the unit slowly along the work.



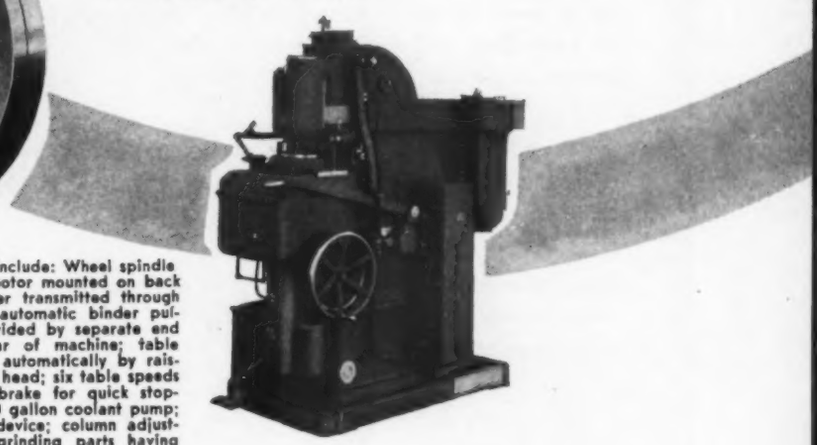
Walker Style D Face Plate with "Concentric Gap" — for rotary chucking service.

A 20 TO 50% SAVING IN CHUCKING TIME

A complete line of Walker Magnetic Chucks are available for lathes—shapers—drill presses—grinders—Ask us to demonstrate how they will enable you to get maximum productive time by reducing set up time—in the tool room or in production. Let us point out the savings you can make through more and better work in less time and through the elimination of spoiled work.

IMPROVED WALKER SURFACE GRINDER a cost cutter on high production . . . . . .

Redesigned and improved this Walker Single Stroke Surface Grinder assures high production at low cost on a wide range of work.



Outstanding features include: Wheel spindle driven by a 10 HP motor mounted on back of column with power transmitted through horizontal belt with automatic binder pulley; table drive provided by separate end shield motor at rear of machine; table started and stopped automatically by raising or lowering wheel head; six table speeds available with foot brake for quick stopping; motor driven 30 gallon coolant pump; wheel head locking device; column adjustment provided for grinding parts having hubs up to 6" diameter.

O. S. WALKER CO., INC.

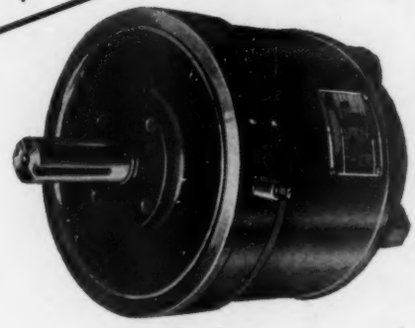
WORCESTER, MASS., U. S. A.

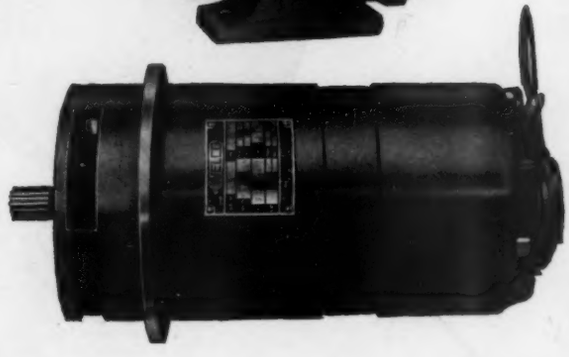
WELCO

TORQUE MOTORS

POWER

WHERE YOU WANT IT!





WELCO TORQUE MOTORS have proven very useful to the Machine Tool and other industries, by the flexibility of their adaptation and simplicity of providing suitable electric motive power where it is needed.

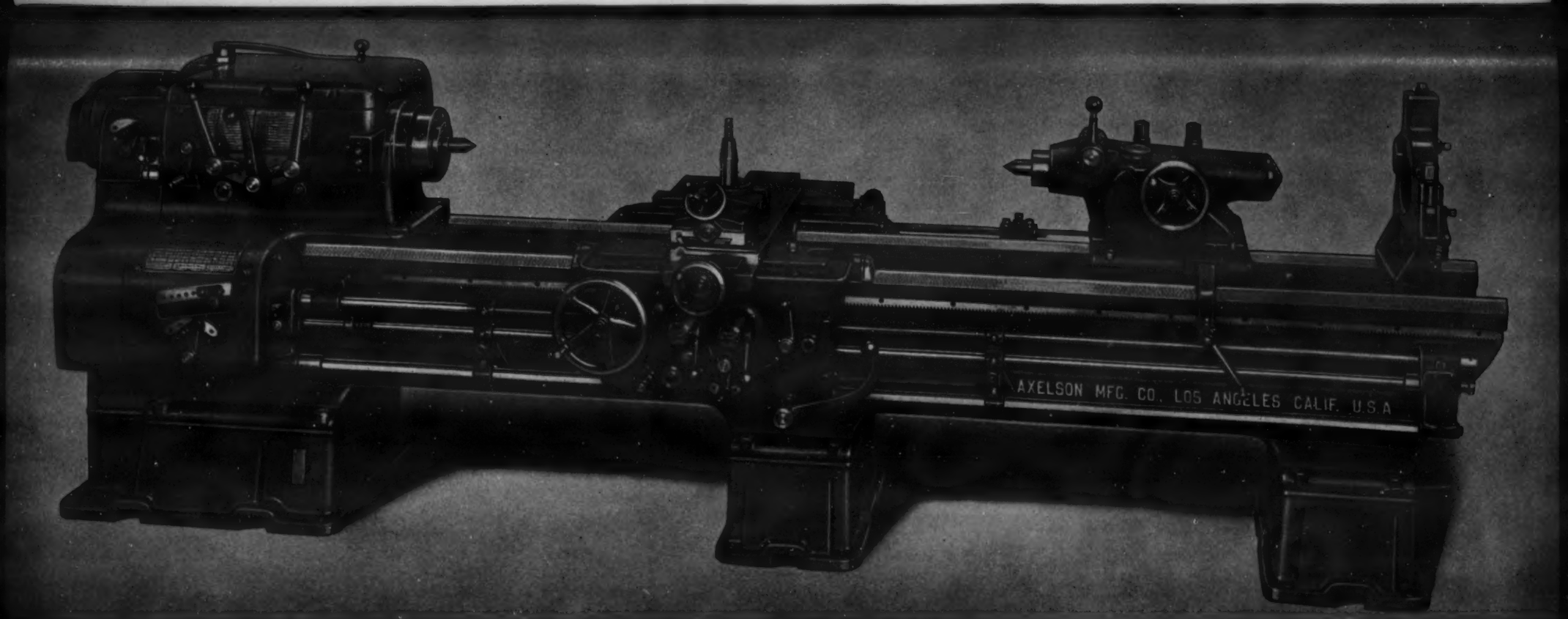
These WELCO "little giants of power" have helped many engineers to solve otherwise intricate and costly motions at a saving in cost and maintenance. Extensive use is being made of these motors for the remote operation of periodical and intermittently moving parts. They become a part of the machine.

Suggested applications are for clamping, unclamping, raising, lowering, traversing, indexing and for operating clutches, valves, levers, gear changing, etc.

Our Engineers will be glad to assist in any motor application which you may have and submit a proposal for your consideration.

THE B. A. WESCHE ELECTRIC CO.

CINCINNATI, OHIO



MODEL D 20" AXELSON 24-SPEED LATHE

HEAVY DUTY CAPACITY WITH TOOL ROOM ACCURACY

Here is a Lathe which compares in ease of operation and accuracy with tool-room machines, yet has the rigidity, durability, and freedom from need for frequent adjustment that are required for heavy duty service. It will save you money in many ways—by lending greater effectiveness to your machinists' skill, and by simplified maintenance throughout a long service life.

The Model D 20" Lathe is precision-made in every respect, upholding Axelson's 24-year reputation as a manufacturer of highest quality Lathes which combine modern engineering and practical design expressed in high grade materials. Castings are produced under controlled practice in Axelson's own foundry, and all parts are precision-machined in Axelson's own plant.

Write for full information regarding the Model D 20" Lathe today, and for the bulletins describing the 14", 16", 18", 24" and 30" Axelson Lathes.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

DEALER INQUIRIES INVITED

QUICK FACTS

24-Speed Headstock—Unit Mounted Motor
Alloy Steel Gears, Hardened and Ground
Double Clutch for Forward and Reverse Spindle Rotation
Automatic Brake—Cam-Lock Spindle Nose
Anti-Friction Quick Change Gear Box
Automatic Lubrication of Cross Slide and Compound Slide
Automatic Lubrication of Bed Ways
Automatically Lubricated Apron
2-Speed Tailstock Spindle—Rigid Taper Attachment

Spindle Speeds—9½ to 721 R.P.M.
54 Threads—1½ to 92 per inch
49 Feeds—0.003" to 0.185" per Spindle Revolution
12¼" Tailstock Spindle Travel

Friction Locks on Cross Slide and Compound Rest
Angular Compound Slide Handwheel
Cone Type Feed Clutches
Enclosed-Jaw Steady Rest

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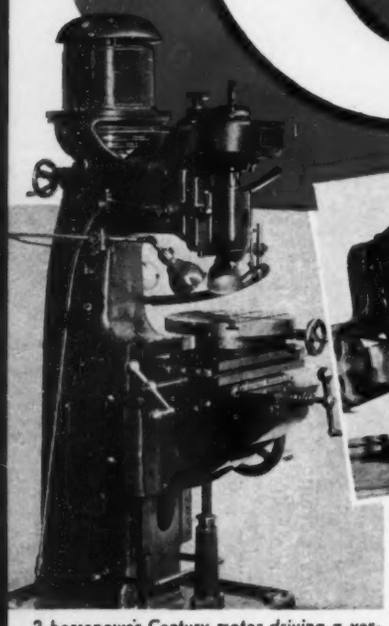
3844 Walsh St., St. Louis, Mo.

It Will Pay You to Investigate



2 horsepower Century motor driving a vertical milling machine

½, 2 and 5 horsepower Century motors driving a crankshaft grinder

Call in the CENTURY MOTOR SPECIALIST Nearest You

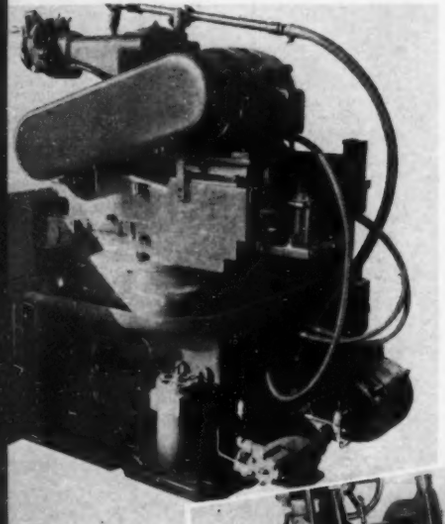
His Advice Will Serve You Well

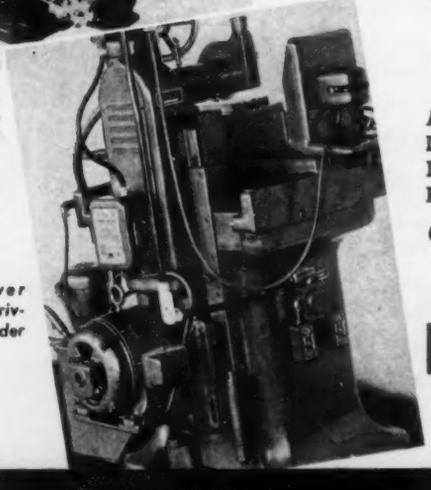
The Century Motor Specialist is a highly trained engineer, thoroughly experienced in the proper application of Century Motors to fit a particular job. Century Motor Specialists, located in 30 key cities of the United States, have an average of 18 years of experience in this specialized field. They are trained to aid you in solving any problem involving the application of electric motors.

Behind every Century Motor Specialist is the 36 years of experience of the Century Electric Company, one of the largest exclusive motor specialists in the world.

You and your engineers can accept the recommendations of the Century Motor Specialist with complete confidence — for he would rather lose a sale than recommend an inefficient motor application.

It will pay you to see one of the Century Motor Specialists — just call in the one nearest your office. His experience is at your service and he's there to serve you and your company.





½, 2 and 5 horsepower Century motors driving a grinder

1½ horsepower Century motor driving a surface grinder

CENTURY ELECTRIC COMPANY

1806 Pine Street, St. Louis, Mo.

Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Cincinnati • Cleveland • Dallas
Davenport • Denver • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City
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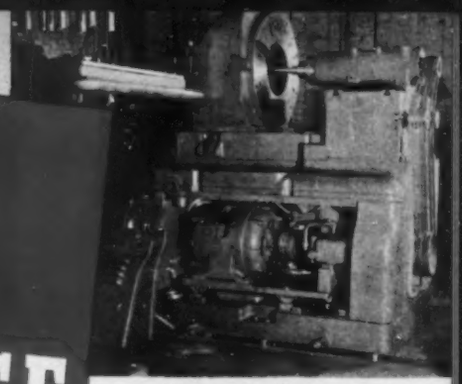
One of the Largest Exclusive Motor Manufacturers in the World

SPECIFIED PERFORMANCE — Century MOTORS

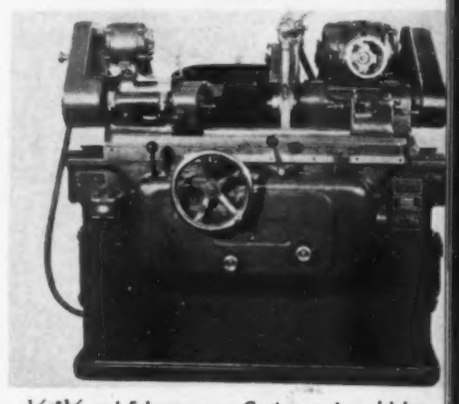
Century

SPECIFIED PERFORMANCE For Machine Tools

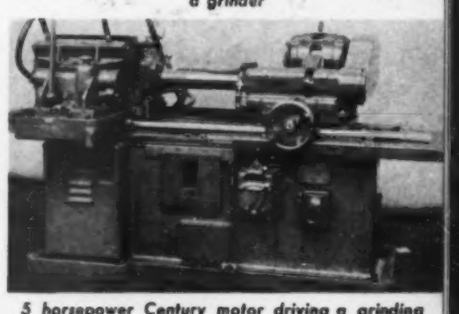


5 horsepower Century motor driving a boring machine

3 horsepower Century splash proof motor driving a stub lathe

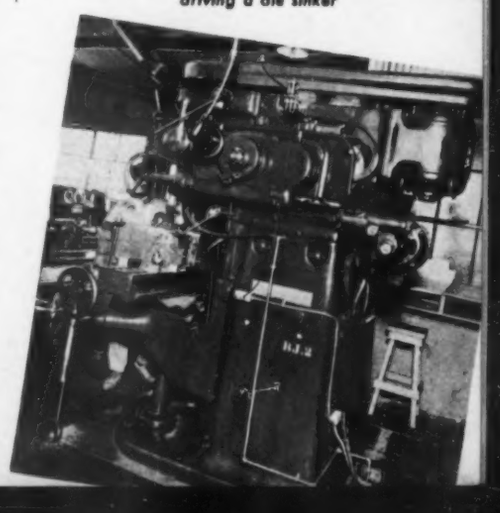


½, 1½ and 5 horsepower Century motors driving a grinder



5 horsepower Century motor driving a grinding machine

(Below) ½ and 2 horsepower Century motors driving a die sinker



BECAUSE of Century's years of specialization in the design, manufacture and application of electric motors, Century can accurately specify in advance the type of performance each installation will deliver. Specified performance means that you know what to expect from Century Motors; know that they meet the load requirements of the machine they drive; providing dependable, efficient, economical power throughout an exceptionally long motor life.

Century's high standards of quality, advanced engineering and precision manufacturing methods, plus extremely wide range of types, forms and flexibility of performance, offer many advantages when applied to machine tools.

Important Century Construction Features

Sleeve Bearings* — Built with greater safety factor against abnormal belt tension stress — thick walls give sustained accuracy of roundness and alignment — shoulder provides large thrust surface, prevents lateral shifting of bearings.

These heavy duty, long life features result from sleeve bearings machined from phosphor bronze castings, diamond bored for accuracy.

*All sizes available with ball bearings.

Balance — Motor vibration frequently registers on the work surface — prevents close tolerances.

Century general purpose stock motors have gained an enviable reputation for being remarkably free from vibration.

End Play Shock Absorbers — End "bumping" of armatures, caused by V-belt or sheave irregularity, is prevented by steel enclosed cork end play shock absorbers. Result — more accurate work — quieter operation.

Century Specialized Insulations — Resist mechanical impact of abrasives and oil deterioration — give long motor life.

Self Cleaning — Century Motors keep clean inside because the ventilating passages are large and smooth— dirt blows through. Another factor in long motor life.

Appearance — Good looking, smooth, streamlined exterior appearance matches the modern trend of industrial designing.

Wide Selection of Types and Sizes

Wide range of sizes 1/100 to 600 H. P.

Century Open Motors—for use above the work line.

Century Splash Proof Motors—for use below the work line, giving protection against falling chips and splashing liquids.

Century Dust Tight Motors—totally enclosed and totally enclosed fan cooled motors for use in atmospheres containing high speed cutting oils carrying abrasives.

Century Horizontal Motors—for floor, side wall, or ceiling mounting.

Century Vertical Motors—

Century Motors for Flange Mounting—

Century Motors with Cushion Bases—

Century Offers You Flexible Performance

For Shock Loads—A Century Motor that will absorb punch press shock loads, smooth the load and give longer machine life.

For Hard to Start Loads—A Century Motor designed for high starting torque.

For High Inertia Loads—A Century Motor designed for long, smooth accelerating periods.

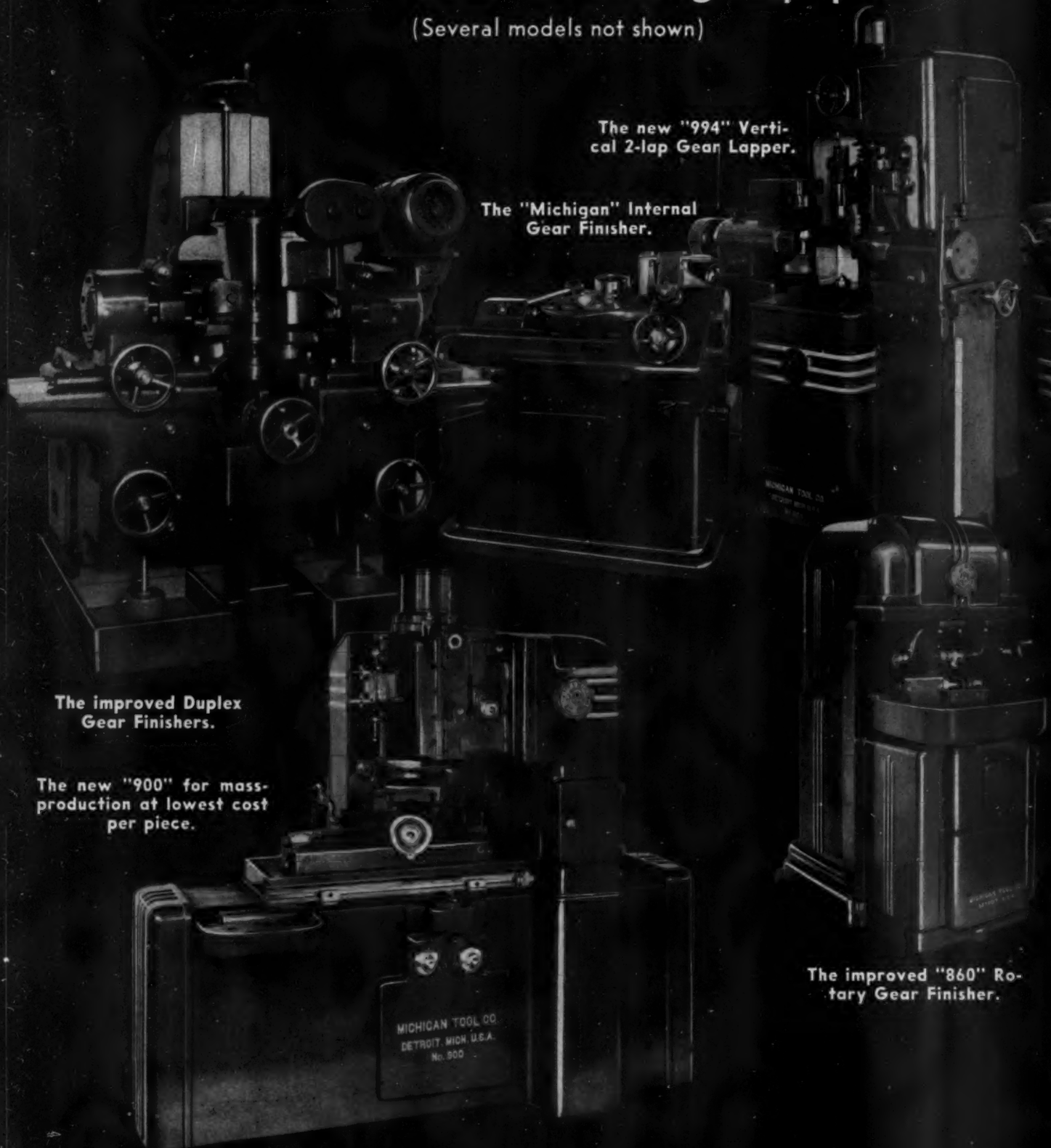
For Multi-Speeds—Century offers many combinations of Multi-speed motors to serve the most efficient use of special alloy tools with proper speeds and feeds.

Such flexibility in design and performance assures a motor that fits the job — and because it fits, gives superior results. Century's Specified Motor Performance is your assurance that a Century Motor application to your product or plant will deliver the type of performance that means steady production and reduced maintenance expense.

Better Gears? Here is

The Complete New Line of "Michigan" Gear Finishers, Gear Lappers and "Sine-Line" Gear Checking Equipment

(Several models not shown)



The new "994" Vertical 2-lap Gear Lapper.

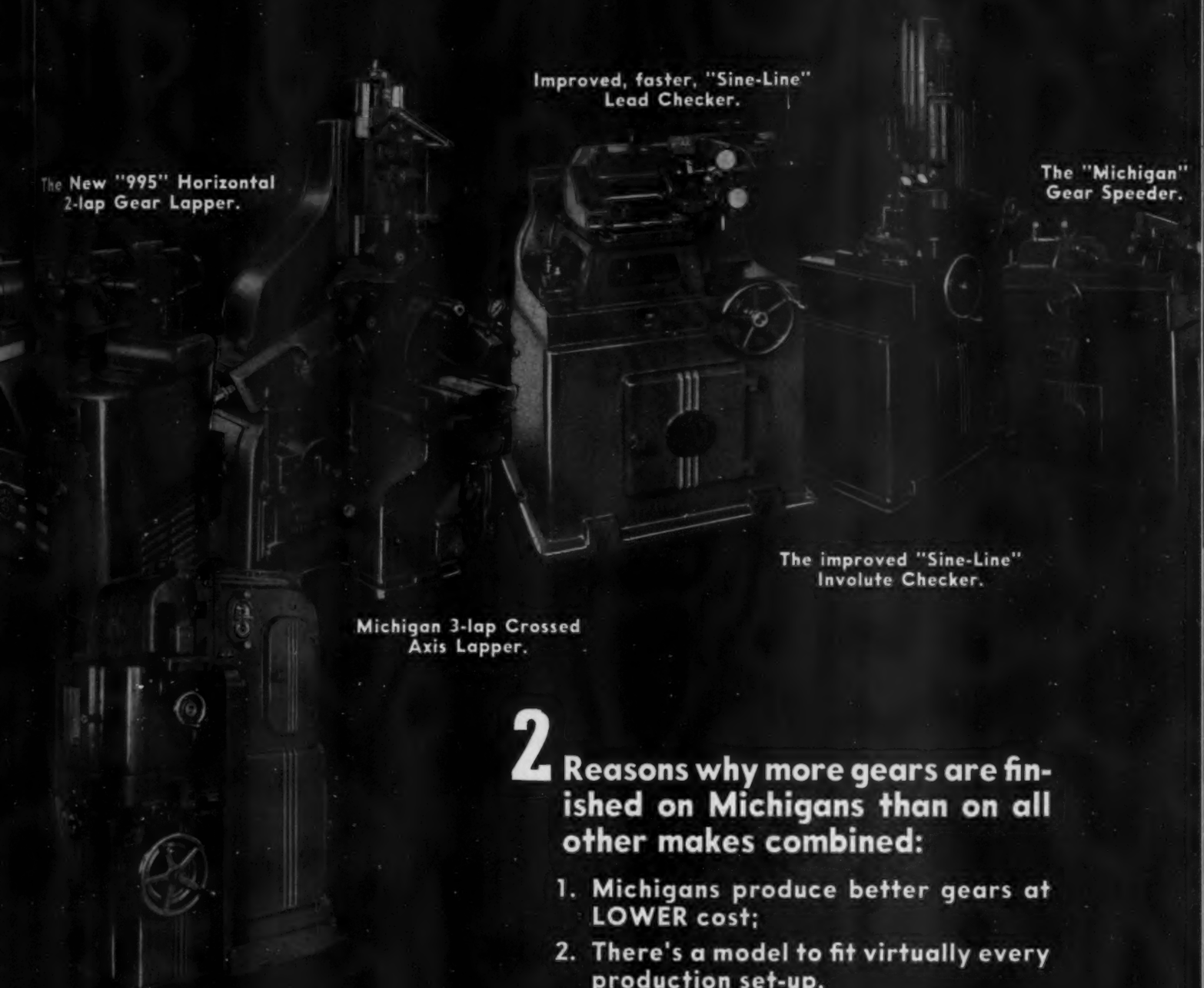
The "Michigan" Internal Gear Finisher.

The improved Duplex Gear Finishers.

The new "900" for mass-production at lowest cost per piece.

The improved "860" Rotary Gear Finisher.

your answer...



The New "995" Horizontal 2-lap Gear Lapper.

Improved, faster, "Sine-Line" Lead Checker.

The "Michigan" Gear Speeder.

The improved "Sine-Line" Involute Checker.

Michigan 3-lap Crossed Axis Lapper.

The "860A" Rotary Gear Finisher for job lots:

2 Reasons why more gears are finished on Michigans than on all other makes combined:

1. Michigans produce better gears at LOWER cost;
2. There's a model to fit virtually every production set-up.

(Catalog on Request)

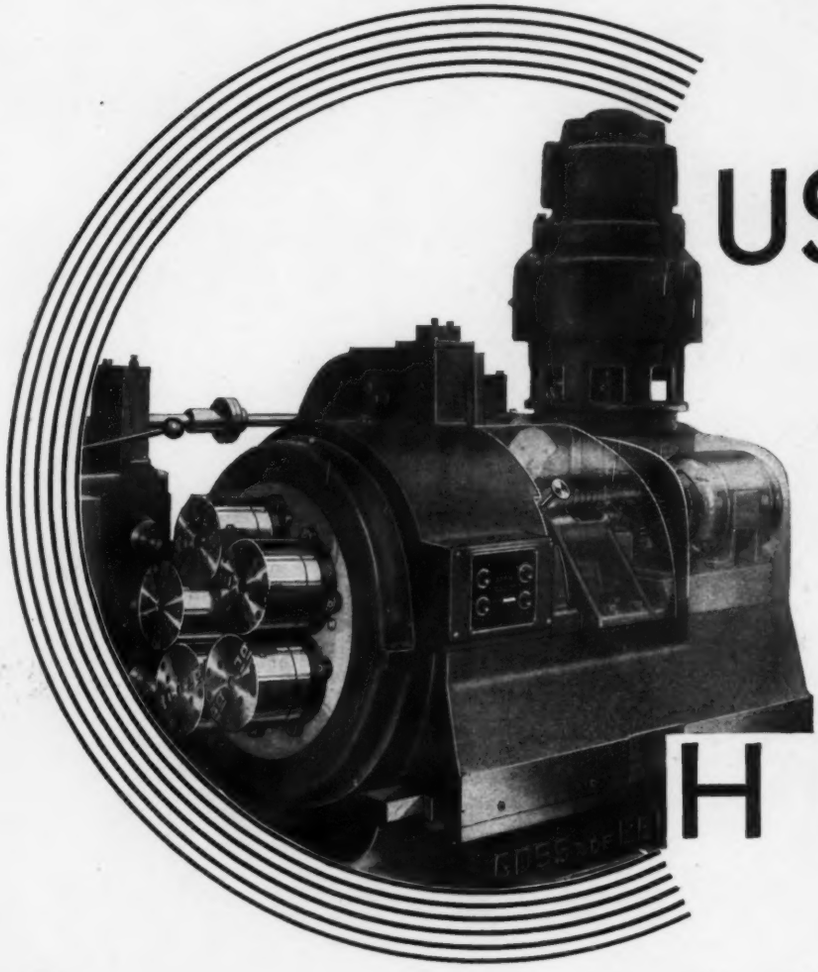
Ask us about "Curve-Shaving" (Bulletin No. 150) and "Cone-Drive" Worm Gearing (Bulletin No. 148).

MICHIGAN TOOL COMPANY

7171 E. McNichols Road - - - - - - Detroit, Michigan

Be sure to visit the Cushman exhibit

at the NATIONAL MACHINE TOOL SHOW



CUSHMAN

FOR PROFITS
MACHINE
TOOL SHOW
CLEVELAND
OCT. 4 to 13, 1939

Booth 2109

CHUCKS

Progress in work holding . . .

Important new chucking developments engineered by Cushman will be exhibited for the first time at the National Machine Tool Show in October. Every engineer charged with responsibility for precision production in metal working plants should be sure to see these outstanding advances in work-holding technique:

1. Dynamic Balance.
2. Hardened Steel Precision Chuck Bodies.
3. Increased jaw pressures under perfect control at all times.
4. An improved Spring-power Operating Mechanism for jaw follow-up on work where scale and unequal surfaces might otherwise cause problems in positive work-holding.
5. A new type of Segment Wheel Chuck for grinders.
6. Light, medium and heavy duty precision Chucks for direct mounting on American Standard, Cam Lock and Long Taper Key Drive Spindle noses.
7. New Spring Operated Power Chucks especially adapted to latest type multiple spindle machines.

Most of the above equipment will be exhibited under operating conditions that indicate the great advances made in working toward greater precision and simplicity and lower floor-to-floor time in production line and tool room work.

Qualified engineers and sales representatives of the Cushman Chuck Company will be in constant attendance at Booth 2109 to discuss the above equipment with you.

A world standard for **PRECISION**

THE CUSHMAN CHUCK COMPANY, HARTFORD, CONNECTICUT

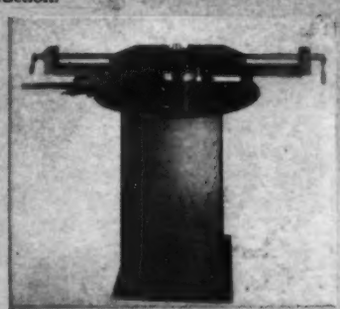
CHUCKING ENGINEERS *Since 1862*

SEE HOW YOU PROFIT *with* WELDED DESIGNS

QUICKER DELIVERY—SEE how welded designs cut production time. For example, the base of Yoder cold roll forming machines are produced in 5 or 6 days as compared to 12 to 18 days with former construction. Weight saving is 33%. Cost of finished welded base equals cost of patterns alone used for former construction.

IMPROVED APPEARANCE—SEE how tools have been improved in appearance as well as in performance with welded steel construction. Example: This new model South Bend Lathe on welded steel bench.

LOWER COST—SEE how welded designs such as this Doall Metalmaster give the buyer better machines at less cost. This all-welded machine sells for 33% less, weighs 25% less and has 2" greater throat capacity than the previous model.



REDUCED WEIGHT—SEE how welded steel has reduced the weight of tools and made them more rigid and practically unbreakable. This Wallace Bender weighs 736 lbs. as compared to 1230 lbs. for the former construction, cutting shipping costs and simplifying installation.

IMPROVED PERFORMANCE—SEE how rigid, one-piece, all-welded frames of machines give superior performance. This frame of a Sturdybender bending press takes the heavy loads with minimum deflection, saving power and avoiding wear on ways and bearings.

GREATER PROFIT—SEE how *you* can cut costs and improve *your* products with welded steel construction!

Engineers in the nearest Lincoln office—experienced in all phases of welding production—are at your service. Call them or write—

THE LINCOLN ELECTRIC COMPANY

DEPT. A-641, CLEVELAND, OHIO • *Largest Manufacturers of Arc Welding Equipment in the World*

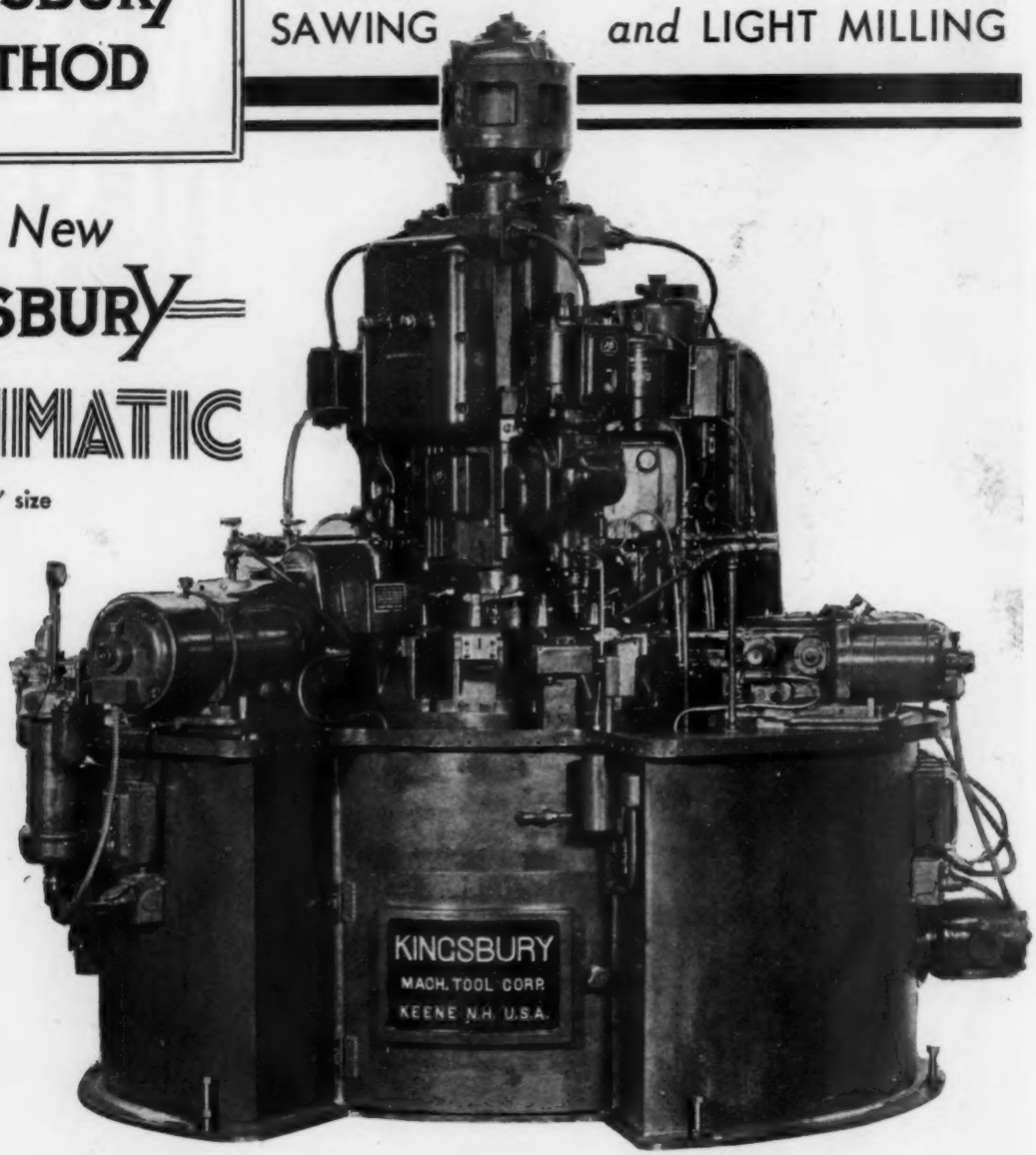
AUTOMATIC DRILLING *by the* KINGSBURY METHOD

The modern way to step-up production and cut down costs in DRILLING, TAPPING, COUNTERBORING, REAMING, FACING, SAWING *and* LIGHT MILLING

The New

KINGSBURY FLEXIMATIC

28" size



KINGSBURY indexing type machines are made in the following sizes of tables: 12", 20", 28", 36", 50". These machines give maximum production, maintaining a high degree of accuracy of product.

KINGSBURY MACHINE TOOL CORP., Keene, New Hamp.

ORIGINATORS OF THE AUTOMATIC DRILL HEAD UNIT

MATTISON

HIGH-POWERED PRECISION SURFACE GRINDER

TABLE SIZES
From 12″ to 30″ wide
by 36″ to 192″ long

The sound, fundamental principles of construction which have permitted users of Mattison Surface Grinders to obtain close accuracy, fine finish, increased production, rapid stock removal and a quick return on their investment remain intact. However, there have been many refinements from time to time which will now make the Mattison, more than ever a machine to be considered in your efforts to lower costs and increase profits. Send for complete information.

MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS

FILES OF PRECISION

Every **AMERICAN SWISS FILE** *Exhibits this Trade Mark*

TRADE FILES ONLY THE BEST ARE GOOD ENOUGH MARK TOOLS

ON THE TANG . . .

. . . and is YOUR assurance of superior quality and greater economy

AMERICAN Swiss Pattern Files of Precision are produced in the United States and manufactured from the highest grade file steel to closest specifications. They are a quality file and can be depended on for fast cutting, better work and low cost production.

The reputation of American Swiss Files of Precision is known wherever exact filing is involved.

More than 2500 cuts, shapes and sizes from which to choose, *including:*

Hand — Pillar, (Regular) — Pillar, (Narrow)— Pillar, (Extra Narrow) — Half Round — Slim Half Round — Half Round Ring — Crossing — Knife — Warding — Equalizing — Barrette — Cant — Pippin — Crochet — Round —Square — Three Square — Metal Saw — Slitting — Checkering — Parallel Round — Bench — Screw Head—Spark Plug—Half Round, (Coarse Cut) — Flat, (Coarse Cut) — Finishing — Mill — Mill, (2 Round Edges) — Taper Saw — Slim Taper Saw — Round Edge Joint — Square Edge Joint — Die Sinkers — Needle — Escapement — Die Sinkers' Rifflers — Silversmiths' Rifflers — Machine.

Lengths: in 3" to 12" inclusive. Cuts: #00, #0, #1, #2, #3, #4, #6

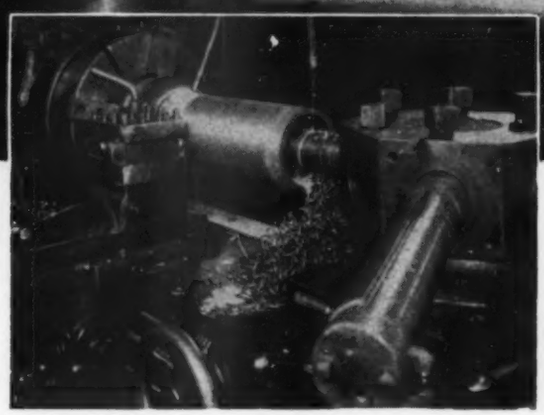
Write for complete catalog. **Also manufacturers of Mechanics Hand Tools and Knurls.**

American Swiss File & Tool Co., Elizabeth, N. J.

ALSO MANUFACTURERS OF MECHANICS HAND TOOLS AND KNURLS

Here's A SIMPLE WAY TO SAVE 4 HOURS PER PIECE!

The Gisholt cross feeding hexagon turret is used to excellent advantage in machining these large pump liners, which are 8⅞" in diameter by 31¾" long. They are chucked in a Gisholt chuck and machined complete in one operation with Gisholt standard tools and boring bars. Turning and boring operations are carried on simultaneously in both roughing and finishing operations, which greatly reduces machining time. To bore the hole, it is only necessary to set the hexagon turret off center, and use single point boring bars. The material is SAE 4615 steel. From ¼" to ½" of stock is removed from both the inside bore and the outside diameter, which is a lot of metal. Yet, this Gisholt 4L Heavy Duty Turret Lathe does it quickly and accurately—doing the job in 2 hours and saving 4 hours per piece.



★ *The Gisholt bed and headstock are cast in one piece. The beds are extra wide and have hardened steel ways. The Gisholt Cross Feeding turret is built with a dovetail guide and has a taper gib adjustment and a square lock gib at the extreme rear of the slide. These features provide the necessary rigidity and permit fast speeds with multiple cuts and maintain the machine's original accuracy.*

•

Literature on Gisholt Heavy-Duty Turret Lathes is available on request.

"YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS"

GISHOLT

GISHOLT MACHINE COMPANY

1201 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES • AUTOMATIC LATHES • TOOL GRINDERS • BALANCING MACHINES

HAVE YOU A

WEAR RESISTANCE PROBLEM?

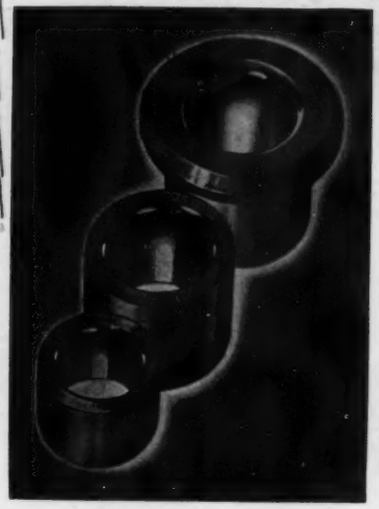
Consider . . . TALIDE!

Tungsten Carbide Wear-Metal

MADE IN ANY SIZE . . . ANY SHAPE!

BUSHING LIFE INCREASED 30 TIMES

● Illustration at right shows SOLID Tungsten Carbide Bushings, lapped to a mirror finish. Aside from maintaining accuracy to .0001", TALIDE, on this application, provided 30 times longer life, thereby substantially reducing replacement costs.



TALIDE does a better, cost-reducing job of resisting wear, because it—

1. **Maintains size 25 to 50 times longer.**
2. **Reduces downtime.**
3. **Eliminates costly replacements.**
4. **Improves efficiency.**

TALIDE possesses unusual toughness . . . and, more important still, it offers the unique advantage for Tungsten Carbide of being available in *any length, shape or size.* Already, in addition to bushings, TALIDE has been successfully applied in prolonging the service life of *lathe centers, work rest blades, gage surfaces, coiling guides and arbors, sizing dies, burnishing rollers, chilling plates for hardening and tempering thin stock, sand blast nozzles, mold liners for pressing powdered metals, and many others.*

TALIDE is manufactured in extra long strips, bars, rods, tubes, tips, nibs, and is also available in special shapes.

SEND BLUEPRINTS OR DETAILED INFORMATION ON YOUR WEAR PROBLEMS . . . and we will send you engineering data and prices.

METAL CARBIDES CORPORATION

YOUNGSTOWN . . . OHIO

save hours and dollars with FORD TRIBLOCS

● Ford Triblocs are saving countless hours of time for thousands of users. Because they are fast in operation—and because they are "on the job," ready for use, at all times.

Triblocs are also directly saving countless dollars for these users. Because their first cost is low—and they are maintained at a minimum of expense.

The Ford Tribloc is a quality spur-gear hoist. It is made throughout of high grade drop forgings and malleable castings of certified grade. Its ACCO High Carbon Heat Treated chain has great strength and high elastic limit. Each hoist must stand a 50% overload test before shipment.

Write for information on Triblocs in ¼-ton to 40-ton capacities.

BUY ACCO QUALITY *in Ford Triblocs and other Ford Hoists, in Page Welding Electrodes, Page Wire Fence, Tru-Lay Pre-formed Wire Rope, Reading-Pratt & Cady Valves, Campbell Abrasive Cutting Machines, American Welded & Weldless Chains.*

Order from your distributor

FORD CHAIN BLOCK DIVISION

PHILADELPHIA, PENNSYLVANIA

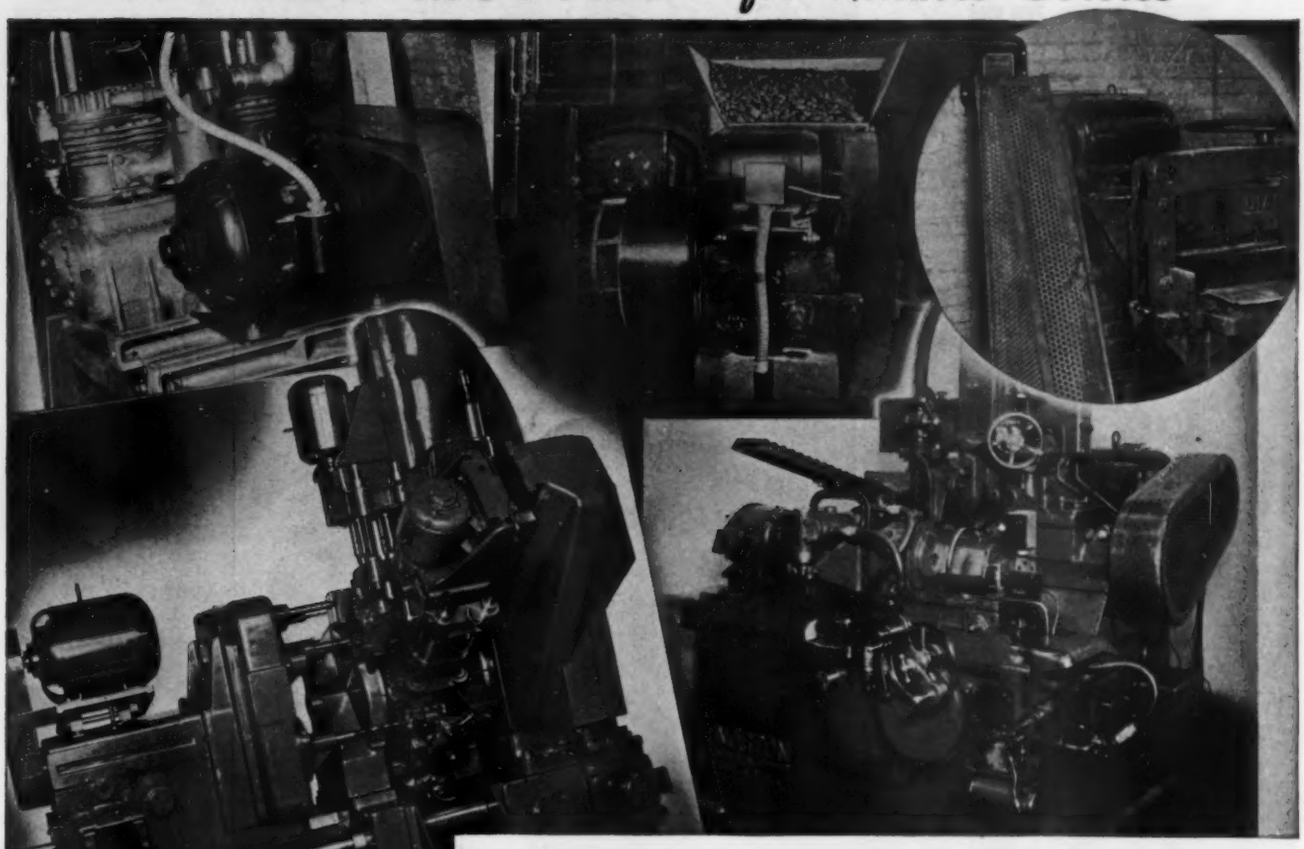
See our exhibit in Metals (Products) Building, Opposite the Perisphere and Trylon, New York World's Fair

TRADE MARK ACCO

AMERICAN CHAIN & CABLE COMPANY, Inc.

In Business for Your Safety

WAGNER MOTORS – *for Reliable Service*



In order to properly select a motor . . . the following points should be considered along with the first cost and maintenance.

Load Cycle
What maximum and minimum horsepower is involved, and what is the probable duration of each?

What are the maximum starting torque requirements?

Is the duty cycle continuous or intermittent, and what method of control and overload protection is contemplated?

Power Supply
A.C. or D.C., and frequency if A.C.
Voltage.
Phase.
Special starting current limitations, if any, imposed by the power supplier.

Speed Characteristics
Single constant speed.
Variable or multispeed.

Mechanical Construction
Is open type motor acceptable, or should Splash proof, Totally-enclosed fan-cooled, or Explosion-proof motor be used

THERE IS A WAGNER MOTOR *for Every Type of Application*

A Good Motor is Not Enough—It Must Be the Right Motor for the Job. Wagner builds such a wide variety of types and sizes of motors that usually there's a motor already available to exactly meet the requirements. And Wagner motors are dependable. They give continuous trouble-free service, requiring very little maintenance other than periodic inspection and lubrication. Their construction features and mounting dimensions are such as to be readily adaptable to the design of the equipment they operate.

Wagner motors have the necessary electrical and mechanical characteristics to adequately and efficiently meet the starting, running, and overload requirements of all types of machine tools and equipment.

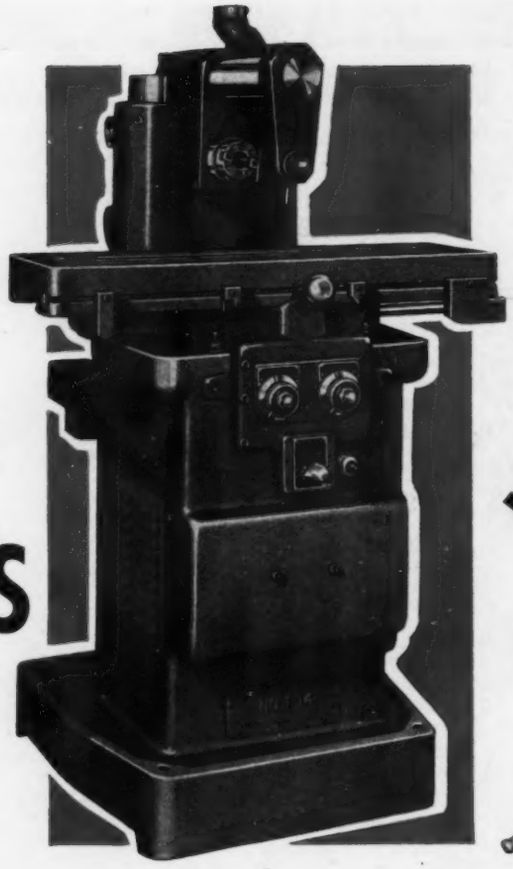
Let a Wagner factory-trained sales engineer assist you in your motor selection. He will make unbiased recommendations as to the right motor for each job.

Write for Bulletins 177, 179, and 182 which completely describe and illustrate Wagner motors.

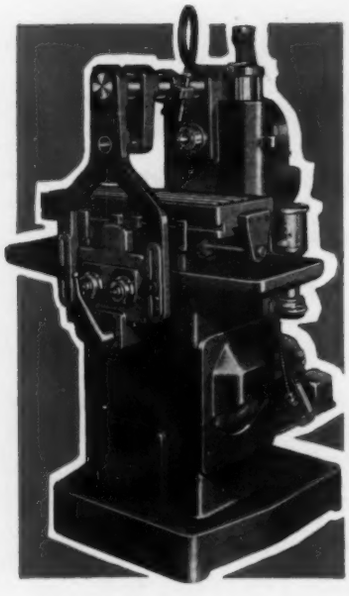
M33-14B

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, Mo., U.S.A.
MOTORS - TRANSFORMERS - FANS - BRAKES

THREE NEW MILLING MACHINES



IMPORTANT ADVANTAGES



No. 1-8 MILLER—Has a 25" long by 9" wide table with hydraulic feed control—8" table travel. It is equipped for rapid traverse in both directions, feed in one direction, automatic shift from rapid traverse to feed, automatic reverse at one end of the stroke and automatic stop at the other end.

No. 1-14 MILLER—Has 32" long by 9" wide table, 14" table travel and fully automatic hydraulic cycle. Table can be fed or rapid traversed in either direction, automatically shifted from rapid traverse to feed in either direction and automatically reversed at both ends of the stroke. It may be stopped at any desired point between the limits of table travel.

• • •

INSTEAD of the conventional cast column mounting, these new Kent-Owens milling machines use two cylindrical ground steel posts for mounting the head. The spindle is carried midway between these posts, eliminating overhang and any possibility of cocking action inherent in cast column construction.

This new construction resists all forces on the cutter regardless of their direction. Thus the assembly is chatter proof for either direction of table feed.

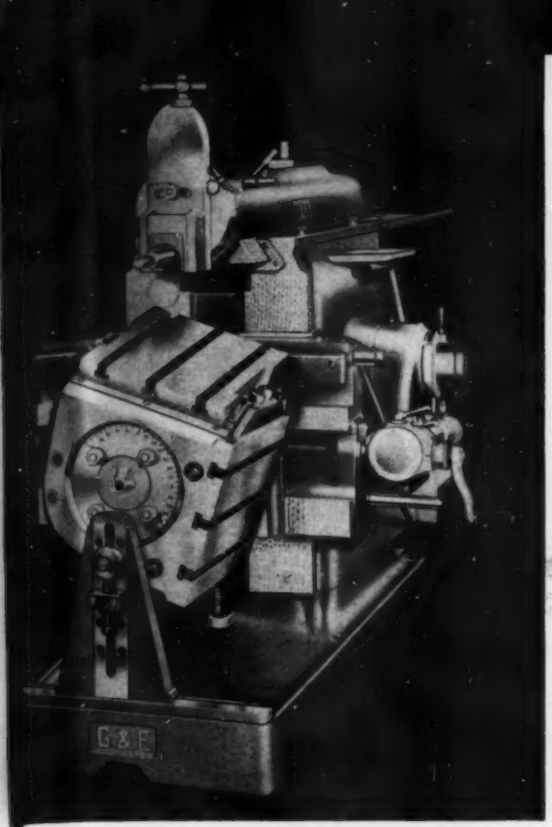
There are only two gear contacts between motor and cutter. One of these is a pair of pick-off gears which provides a wide range of spindle speeds. All gears run in a bath of oil. Total range of spindle speed from 100 to 2000 depending on motor used.

No. 1-M MILLER—For all light and medium hand milling operations. Three T-slot table 25" long by 9" wide. Counterbalanced head. Feed levers both adjustable in position and length. The 1-M occupies only about half of the floor space required by other hand milling machines.

Write for descriptive data

KENT OWENS TOLEDO OHIO

KENT-OWENS MACHINE CO. • 958 Wall St., Toledo, Ohio



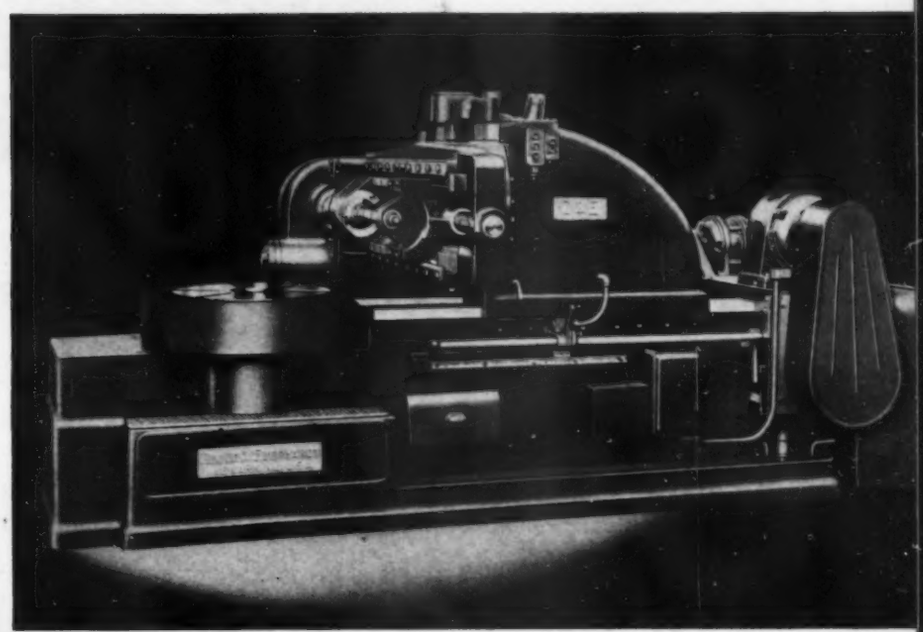
GOULD & EBERHARDT

OFFERS THE

Latest Developments in

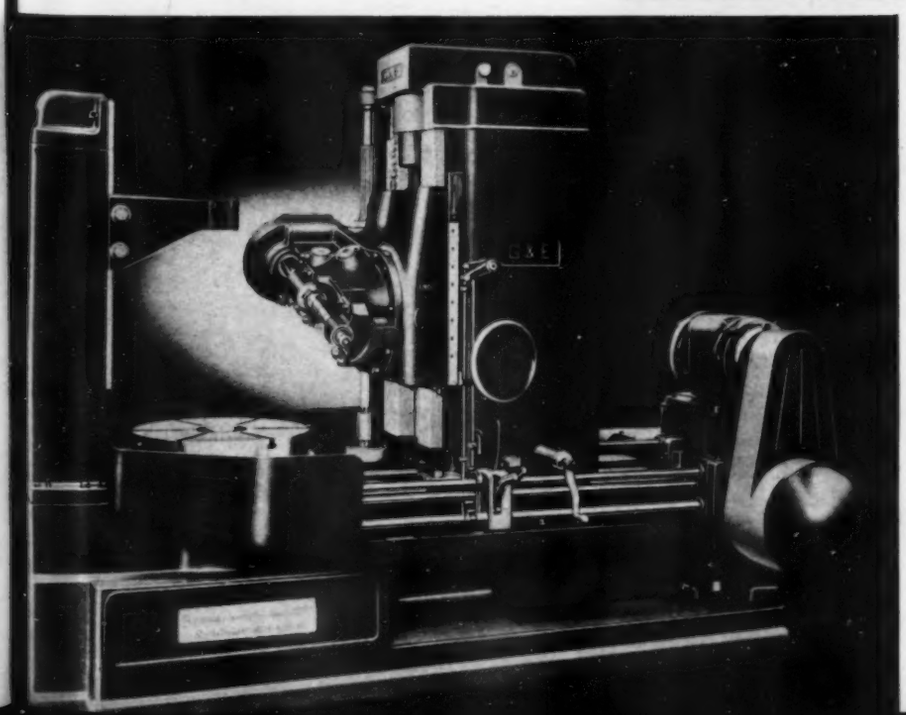
SHAPERS and GEAR HOBBERS

16" Tool Room Universal Shaper with swivel table and tilting top. A high speed machine with ram speeds up to 200 per minute. Especially adapted for tool room and small die work.



40TWG Worm Gear Hobbing Machine for the exclusive production of *worm gears only*. An entirely new development in worm gear machines.

48H Universal Manufacturing Type Gear Hobbing Machine for spur and helical gears; also worm gears, sprockets, etc. One of a complete line of machines to serve all industries.



These modern machines are outstanding examples of the application of specialized experience to the problems of today's production requirements. Further details on request.

GOULD EBERHARDT

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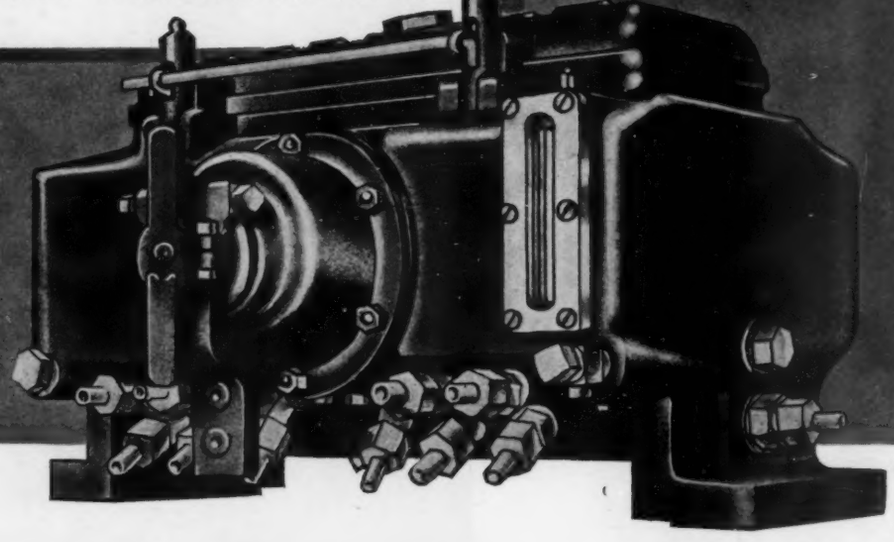
5 *out of* 8*

LEADING MAKERS OF FORCE-FEED LUBRICATORS



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THAT lubrication "keeps the wheels of industry turning" is a familiar truism. And... thanks to modern mechanical force-feed lubricators, automatic lubrication of bearings and cylinders of engines, pumps, compressors and industrial machinery is as dependable as it is economical.

Of the key links comprising the production chain in the manufacture of today's precision built force-feed lubricators, the required cleaning operations rank among the most important. When cleaning is fast and consistently effective, it materially helps assure smooth-running production and low unit costs.

To meet this demand for dependable cleaning, FIVE out of eight leading makers of mechanical lubricators use Oakite materials for better pickling, for removing cutting compounds, oils and grease, cleaning parts before plating and assembly, and other basic operations.

IT PAYS TO CHANGE OVER TO OAKITE

Regardless of what type metal product you manufacture, Oakite materials can give you many money-saving advantages in cleaning and related work. Investigate these worthwhile economies now. Write . . . no obligation.

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Representatives in All Principal Cities of the U. S.

OAKITE MATERIALS & METHODS *Certified* **CLEANING** FOR EVERY CLEANING REQUIREMENT

MACHINERY BUILDERS' CONFIDENCE

• The excellence of Cleveland Worm Gear Speed Reducers is traditional among Machinery Builders everywhere.

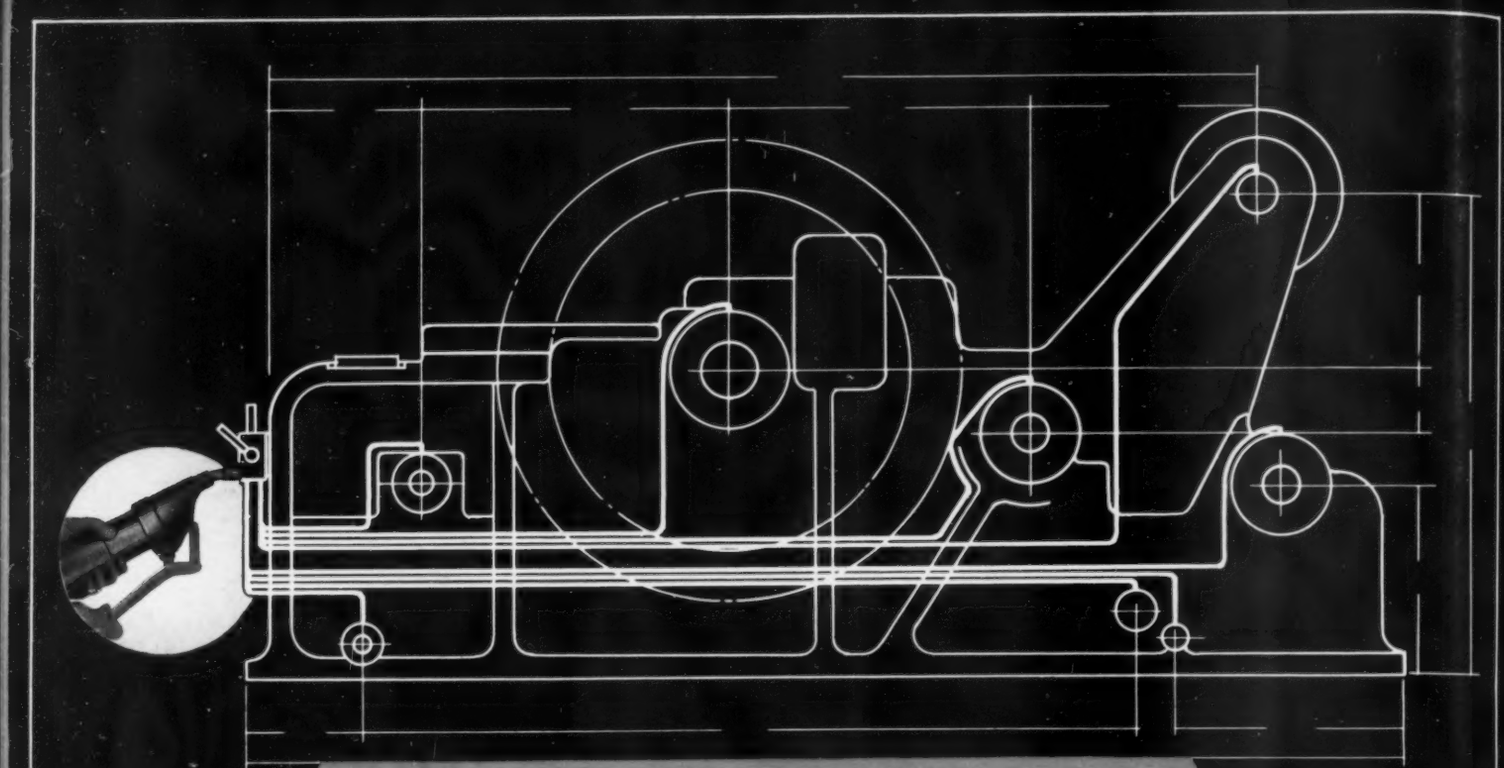
For more than Twenty-Seven years the stamina and dependability of Clevelands have contributed to continuous Machine Performance, and have prolonged useful Machine Life. The highest standards of Engineering and Design, supported by constant Research, have met each new demand of Modern Industry.

Each year has served to increase Machine Builders' Confidence, resulting in multiplied applications for Cleveland Drives.

The Cleveland Worm & Gear Company, 3254 East 80th Street, Cleveland, Ohio.

Affiliate: The Farval Corporation, Cleveland, Manufacturers of Centralized Systems of Lubrication
In Canada: PEACOCK BROTHERS LIMITED

CLEVELAND *Worm Gear Drives*



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Install Farval "DX" without altering your design and . . . lubricate all bearings instantly . . . by hand from a single inlet port . . . knowing that not one bearing is missed

Look at the simplicity of this machine's lubricating system. It's the *new* "DX" by Farval. It forces an exact, measured charge of oil or grease from a standard pressure gun, through a single inlet port, and thence into the Block and Lines, to every bearing—missing none.

The "DX" Block is a Farval product—you know Farval as a leading manufacturer of Centralized Lubricating Systems. "DX" Blocks can be readily applied to your machines during assembly; are reasonably priced and will not materially increase your present selling costs.

Please send B/P of your machines; or use the Coupon.

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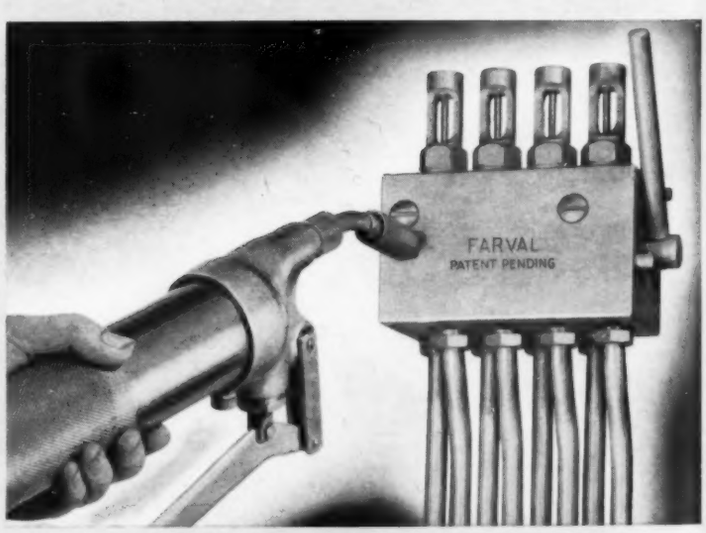
3254 EAST 80TH STREET, CLEVELAND, OHIO

In Canada: PEACOCK BROTHERS LIMITED, Montreal, Quebec



Affiliate of The Cleveland Worm & Gear Company, Manufacturers of Automotive and Industrial Worm Gearing

THE FARVAL CORPORATION
3254 East 80th Street, Cleveland, Ohio

We build _____
(Kinds of Machines)

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(Kinds of Machines)

Please send full information about the new "DX" Multiple Measuring Valve Block.

Company Name _____

Please Address Mr. _____ Chief Engineer

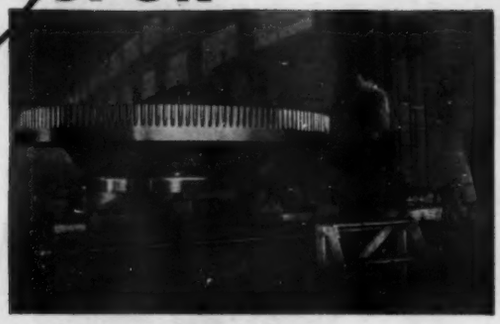
Town _____ State _____

Multiple Measuring Valve

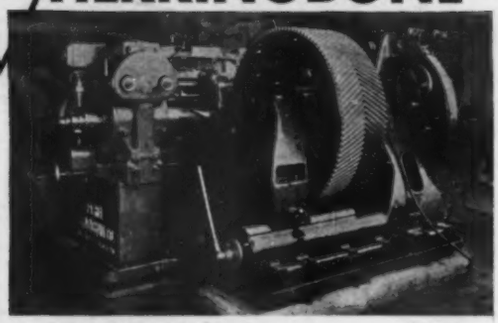
Farval DX

GEARS

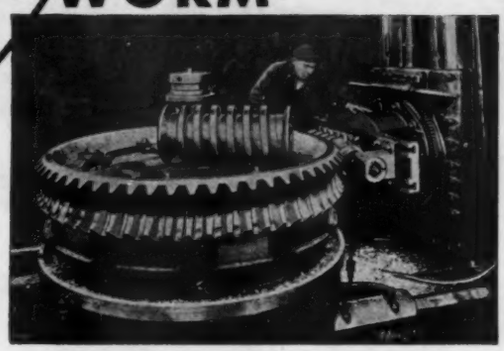
SPUR



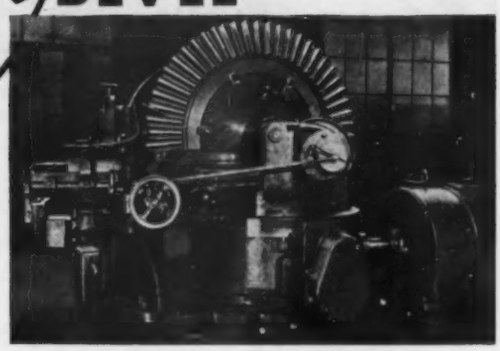
HERRINGBONE



WORM



BEVEL



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SIZES
MATERIALS

Make "Philadelphia" your constant source of supply for all gears. Our facilities and experience enable us to give you complete satisfaction every time. Write today for a copy of the "Gear Book" that gives full facts and figures . . . a real guide book for all gear buyers.

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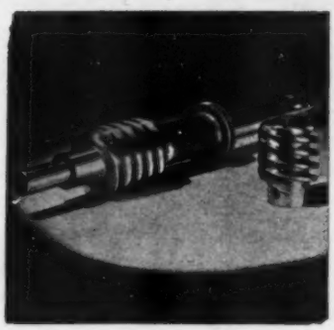
PERKINS

"Custom-Made" Worms and Gears Cost Less!

Here are three excellent reasons why Perkins worms and gears are in the spotlight of success:

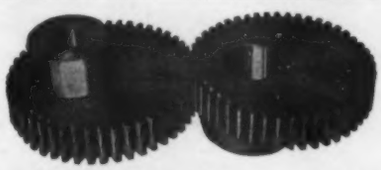


1. They are made to your exact specifications.
2. They save you money because we can make them for less . . . and you can buy them for less.
3. Their long-lasting dependability adds sales appeal to your products.

We act as your gear-making department . . . saving you overhead, meeting your production schedule requirements, and helping you to greater profits.

Send us your blueprints and specifications. We will pass on to you money making suggestions, without any obligation on your part!

PERKINS MACHINE & GEAR CO.
130 Circuit Ave., Springfield, Mass.



ELLIPTICAL GEARS

Also Other Non-Circular Gears

Operates Smoothly and Quietly

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SPECIALISTS in
Quality Gears Cut to Order

MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance, and economy be possible. Tell us what you expect it to do, and we'll show you the *one* gear suited for your job.

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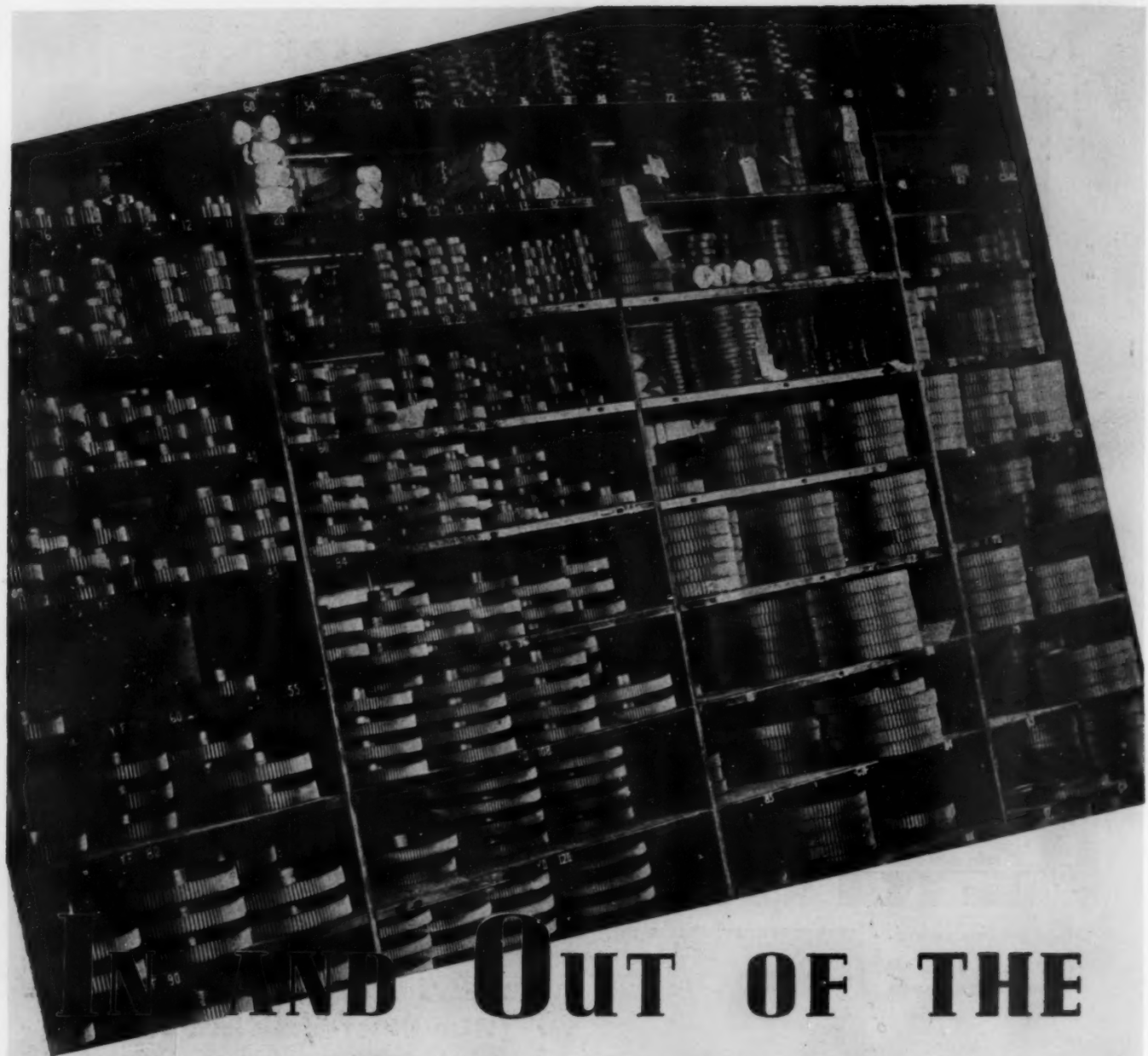
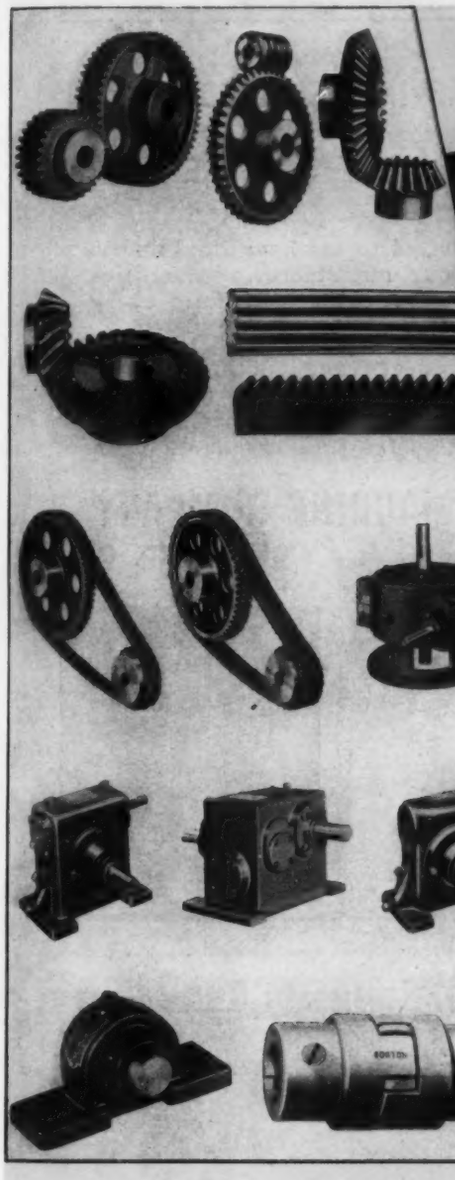


IN AND OUT OF THE MACHINE TOOL INDUSTRY

WITH BOSTON GEAR POWER TRANSMISSION EQUIPMENT

IN the Machine Tool Industry you will find many, many instances where Boston Gear Products are being used as integral parts of machines.

OUT of the Industry you will notice countless places where Boston Gear Products are doing their bit in maintaining efficient operation of plant and equipment.



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The completeness of the range and the constantly maintained high quality of Boston Gear Power Transmission Equipment is the reason for this wide acceptance and World wide use.

All of our branches and distributors listed here welcome a visit from you.

General Catalog #52 containing complete specifications and list prices of Boston Gear Power Transmission Equipment is yours for the asking.

The Boston Gear Complete Line Includes: Gears—All Types. Speed Reducers. Motorized Speed Reducers. Chain. Sprockets. Flexible Couplings. Universal Joints. Shaft Supports. Pillow Blocks. Pulleys. Casters. Ball Bearings and Oilite Bearings.

BOSTON GEAR WORKS, INC., N. QUINCY, MASS.

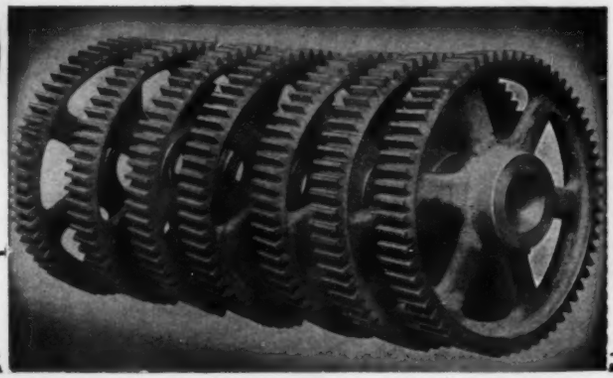
AN OPEN
Invitation to Visit
Our Plant
ANYTIME

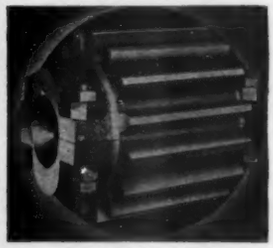
WHENEVER YOU ARE IN CLEVELAND COME AND SEE HOW STAHL GEARS ARE MADE

● You are cordially invited to see how Stahl makes gears—to investigate our manufacturing facilities and the kind of workmanship that goes into every gear we produce.

Your visit will give you an excellent opportunity to visualize Stahl service and appreciate why Stahl is able to execute the most exacting specifications for gears at reasonable cost.

STAHL GEAR & MACHINE COMPANY
CLEVELAND, O.





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MITRES-BEVELS
10 to 48 D.P.
under 6" P.D.

The very latest development in Small Bevel Gear Generating machines are at your disposal here to make such Gears *right* in every particular . . . What are your requirements?

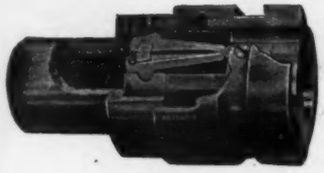
ALSO
SPURS—SPIRALS—WORM GEARING

Made to order only No stock No catalog

Gear Specialties
INCORPORATED
SPS CHICAGO SPS

2600 W. MEDILL AVE. Phone Humboldt 3482

THE JOHNSON FRICTION CLUTCH



Single Clutch showing working parts.

MODERN PTC GROUP DRIVE

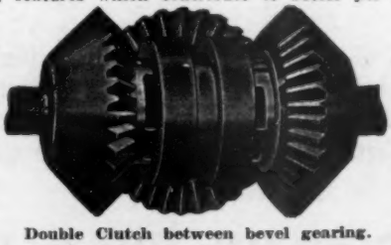
. . for better clutch performance under **ANY CONDITIONS**

More than thirty years of successful application of JOHNSON FRICTION CLUTCHES to practically all power transmission demands is behind every recommendation made by our Engineering Department.

You can, therefore, depend on better clutch performance regardless of the severity of operating conditions, when you bring your clutch problems to JOHNSON Engineers for study.

Among the operating features which contribute to better performance are sensitive starting, safety, cleanliness, quietness, efficiency and long life.

You incur no obligation in asking us to show specifically how you can improve power transmission on your machines. Just give us the details of your problem.



Double Clutch between bevel gearing.

Write for our new BLUE Clutch Catalog No. 93

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

GEAR CROWNING

STOPS NOISE AND PROVIDES OTHER ADVANTAGES AT NO EXTRA COST

Single cam attachment which gives table slight rocking motion. This motion produces crowned teeth with no additional machine time. Cam can be locked in a parallel plane.

CROWNED SPUR GEAR TOOTH

Red Ring Gear Shaving Machine—a most economical method of finishing gears. • PATENT NUMBERS: 2126178, 1989650, 1989651, 1989652, 2111045, 2121479, 2157981.

One troublesome origin of noise in gear sets is due to contact on one edge. Such gear teeth are not parallel, either due to original misalignment or deflection.

The Red Ring Gear Shaving Machine equipped with the crowning attachment renders each tooth slightly barrel shaped. A pair of gears in mesh with one gear crowned will automatically develop adequate bearing, regardless of slight distortion or variations in alignment.

Effective on timing, transmission and certain types of reduction gears, this method of crowning requires no more machine time than conventional gear shaving on this machine.

Hence, crowning is available at *no extra cost*, except the initial cost of the crowning attachment.

Red Ring Gear Shaving, with or without crowning, is a faster, more economical, more accurate method of finishing gears.

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SHOEMAKER AND ST. JEAN • DETROIT, MICHIGAN

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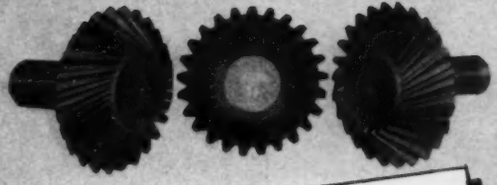
Years of Gears

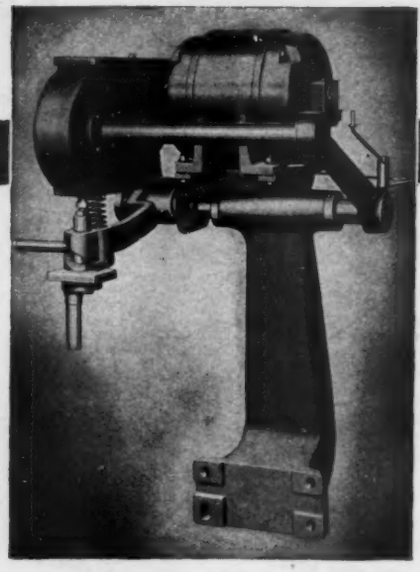


A HALF century of making all types of cut gears for every conceivable purpose has proved the D.O.James service a valuable one. Speedy production without sacrificing D.O.James manufacturing perfection assures you of quality gears *when you need them*. We offer you the accumulated experience, skill and knowledge of fifty years of successful gear making. Let us help you with your next requirements

D.O.JAMES

Send for Catalog No. 150—180 Pages of Engineering Data, Weights and Prices on all Types and Kinds of Speed Reducers

D. O. JAMES MANUFACTURING CO.
Established 1888
1120 WEST MONROE STREET
CHICAGO, ILLINOIS



CULLMAN
Motor Drive Unit

Operated with Instant, Convenient Control and Belt Drive Smoothness

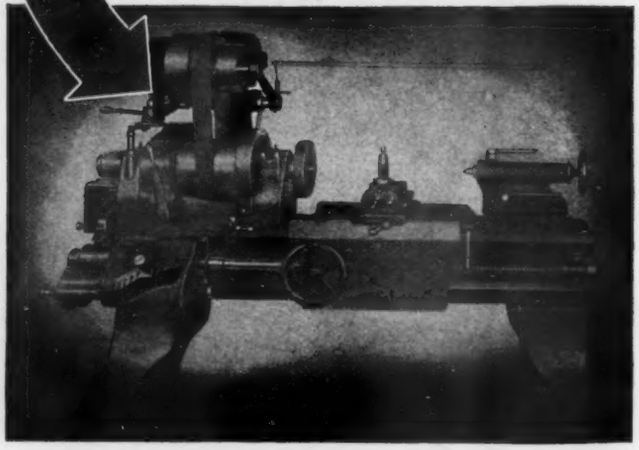
The Cullman Drive is an individual Electric Motor Unit designed to eliminate countershaft and overhead belting arrangements formerly used to drive Cone Pulley Machines.

It increases machine efficiency 25%. Any lathe, shaper, milling machine, screw machine, or punch press can be modernized at surprisingly low cost by the installation of the Cullman Drive. It is simple in construction, efficient in operation and built for long service. Made in sizes for motors ranging from ¼ to 15 H.P.

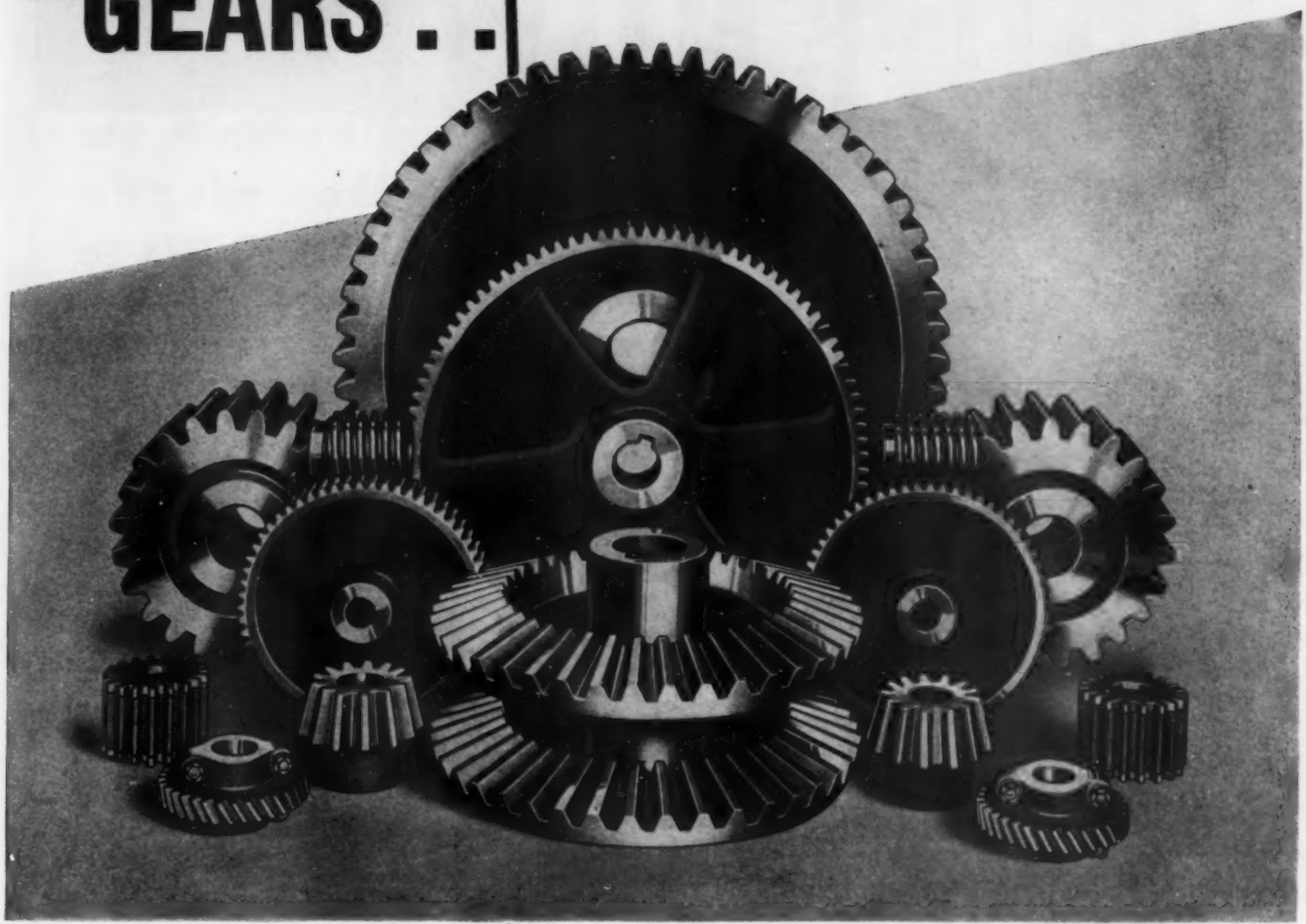
A 60-day FREE TRIAL, without obligation, will convince you of the value of Cullman Drives.

***Write today for full information* regarding this remarkable Motor Drive Unit now used by many leading companies.**

CULLMAN WHEEL CO.
1349 ALTGELD ST. CHICAGO, ILL.



"GEARS . .



. . GOOD GEARS ONLY"

Take advantage of Cincinnati's thirty years of experience and modern facilities to produce your "Gears —GOOD GEARS ONLY". Call on Cincinnati for gears of any and all types and sizes.

We are specially equipped to furnish shaved gears and ground gears and spline shafts to highest precision requirements—in any quantity—economically.

Submit your specifications for a prompt estimate.

THE CINCINNATI GEAR COMPANY

CINCINNATI OHIO

YOU KNOW . . .

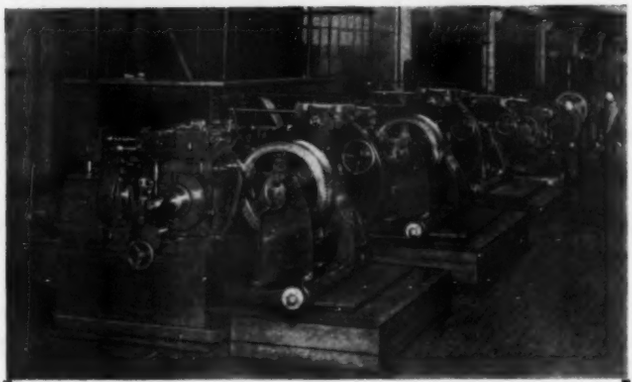
The only GOOD gear is the hardened and GROUND gear . . . Why not use them?

★ ★ ★

- We build GEAR, SPLINE and WORM Grinding Machines
- We are equipped to do contract grinding

THE GEAR GRINDING MACHINE COMPANY
DETROIT, MICH.

FARREL-SYKES
GEAR GENERATORS
are standard equipment with the leading makers of Oil Field Machinery



Battery of Farrel-Sykes Gear Generators in plant of Lufkin Foundry & Machine Co., the largest assembly of these machines in the South.

Seven representative manufacturers of oil field machinery have installed Farrel-Sykes Gear Generators. Typical of their comment on these machines is that of Lufkin Foundry & Machine Co. of Lufkin, Texas: "We are proud of the four gear cutting machines we have . . . . These machines have given us excellent service with the least possible upkeep."

Oil machinery makers like Lufkin have changed to Farrel-Sykes Gear Generators because these machines generate precision gears with high speed and uniform accuracy, and operate for many thousands of hours without wear sufficient to affect their precision appreciably.

They generate with equal accuracy every type of gear used for connecting parallel axes. Their wide range of output includes continuous tooth herringbone gears, any known type of double helical gear, single helical and straight tooth gears with both external and internal teeth, two members of a cluster gear simultaneously, and many other toothed forms and special contours.

Farrel-Sykes Gear Generators are built in six standard sizes for generating gears from the smallest practicable minimum to 264″ diameter, with face widths up to 60″ and pitches from 24 DP to 0.5 DP.

For Complete Details Write for Catalog No. 440

FARREL-BIRMINGHAM COMPANY, INC.
355 Vulcan St., Buffalo, N. Y.

Whether your drawings call for standard or special gears, you will find Grant Gears will give you the high efficiencies and economies that present-day requirements demand.

GRANT GEAR WORKS BOSTON

FINE GEARS of All Types and Sizes
Spur Gears—½ in. to 30 ft. in diameter
Bevel Gears—½ in. to 13 ft. in diameter
Spiral Gears—½ in. to 10 ft. in diameter
Worm gears in any practical size
THE EARLE GEAR & MACHINE CO.
4723 Stenton Ave. Philadelphia, Pa.
85 Liberty St. New York City

EARLE GEARS

GEARS
Spur - Helical - Bevel - Worms - Screws - Racks
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SMALL GEARS
ALSO MEDIUM SIZES IN ALL TYPES AND MATERIALS
Hobbed Pin Rod, Spur, Spiral and Worm Rod
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FOR SIXTY YEARS
Spur — **SPEED REDUCERS** — Worm
ALL TYPES OF CUT GEARS
GANSCHOW GEAR CO., 1007 W. Washington, Chicago

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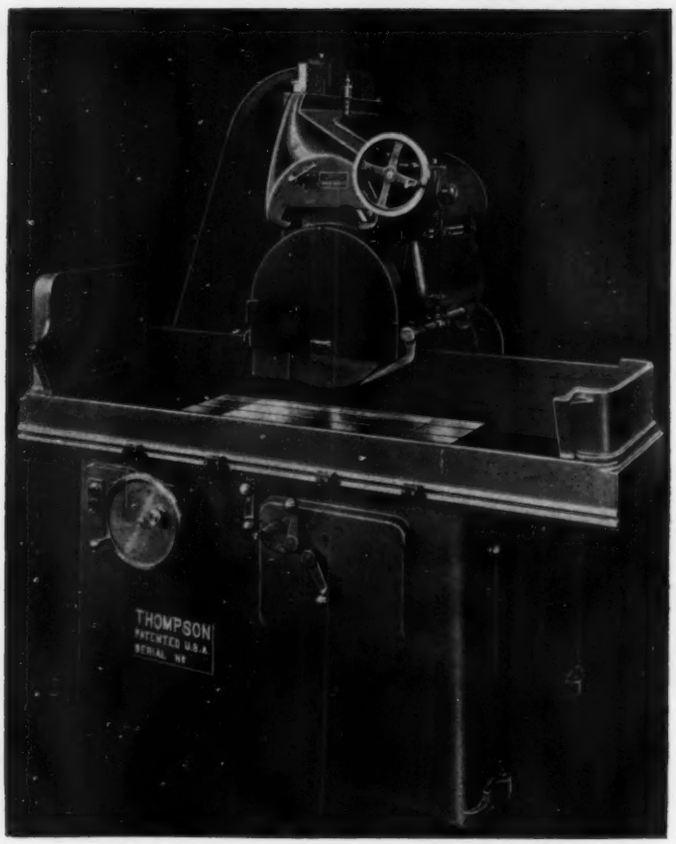


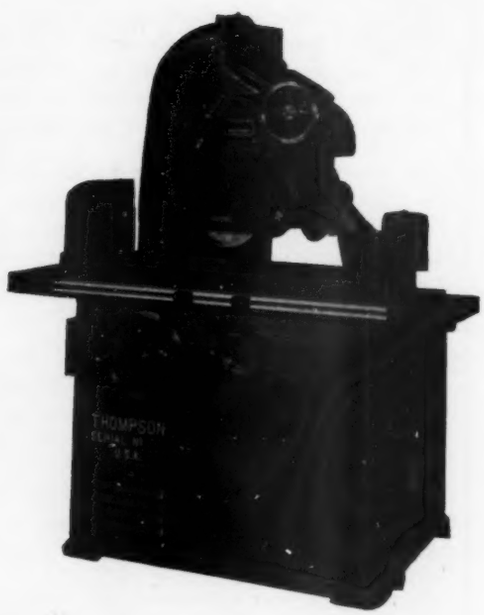
INVESTIGATE THE OUTSTANDING FEATURES WHICH ASSURE

. . . . . fast precision grinding
. . . . . truly flat surfaces
. . . . . automatic wheel turning

IF you are interested in getting finer finish on high production work and in achieving better work at lower cost and with a minimum expenditure of time and effort—investigate the many outstanding features of Thompson Hydraulic Grinders.

Your investigation will reveal the reasons why these modern units are so successfully achieving profitable results in hundreds of leading and progressive metal-working plants.

Ask us to send you complete, detailed and interesting information concerning the modern developments in Thompson Hydraulic Grinders which assure their ability to meet today's most exacting requirements.



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IXL SPEED REDUCERS

IT takes a rugged, efficient speed reducer to deliver power hour after hour—day after day without attention. Production programs in the plants of today don't allow breakdowns that would keep machinery idle. That's why the "heart" of a machine—its speed reducer —must be dependable. IXL Reducers are built that way from the engineering and designing stage to the final testing and inspection. In the complete IXL line you will find a unit to solve any speed reduction problem—whether for products that you sell, or for your own plant use.

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...streamlined for appearance...provided with double pumping action for higher efficiency and finer balance

The new Model #11023-E Ruthman Gusher Coolant Pump is distinctly modern in design to meet the trend in streamlining. It is arranged for flange mounting against the side of coolant reservoir so that coolant flows directly to pump by gravity. A round outlet in the center of the rectangular inlet opening provides for discharge. By means of this design all connections are made internally with passages inside the machine housing. No unsightly external piping is used.

The new "Gusher" provides easy mounting with only four cap screws employed. It is remarkably efficient in operation, having a twin-suction intake communicating independently with upper and lower parts of impeller—a design which results in a double suction action and balanced thrust counteracting weight of shaft.

MODEL 11022 MODEL 11021

Other features include: elimination of packing glands, relief valves and metal to metal contacts; ability to throttle without overloading and to handle non-lubricating and abrasive-carrying liquids and coolant compounds with absolute safety; vertical shaft rotates between precision ball bearings sealed high and dry in motor.

Capacities: 65 GPM with ½ HP motor; 85 GPM with ¾ HP motor.

There's a Ruthman Gusher to insure dependable coolant supply for any production requirement. Investigate today!

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201 PIKE STREET CINCINNATI, OHIO
"Standard and Special Pumps for Every Job!"

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for Supplying Coolant . . .

or for light transfer work

—Two New Centrifugal Motorpumps

Modern—Compact—

Flexible in Installation . . . can be mounted either horizontally or vertically.

No. 240 has flange mounting integral with base...eliminating inlet piping.

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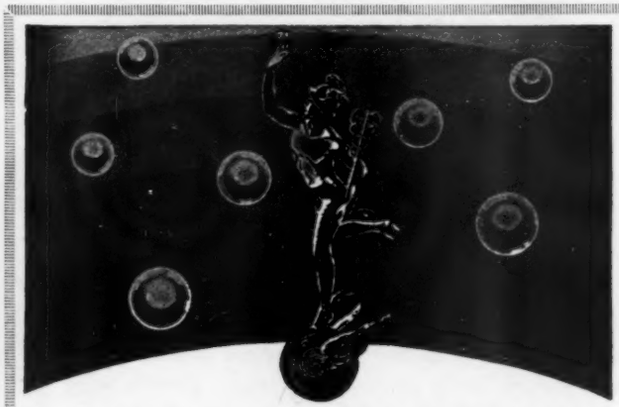
Brown & Sharpe Mfg. Co.
BS Providence, R. I., U. S. A.

BROWN & SHARPE PUMPS



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Poughkeepsie, New York
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DRILL CHUCKS • WHEEL DRESSERS • SPECIAL TOOLS

IT'S difficult enough to develop a market for your product without thinking about costly delays due to tool failure or inefficiency. Making a better product, more economically and without interruption of your production schedule, is the objective of SHIELD BRAND Tools.

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How FAST Could You DOUBLE or *TRIPLE* Your Production . . .

and how much would it cost?

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Under such conditions, the normal increase you can obtain from extra man-power and extra hours of work may be inadequate. The *real* solution then lies in increasing productive facilities, making machines do more work in a given time, producing in one hour that which formerly required two—and doing this without sacrificing essential quality.

The plants in which management is *today* laying the groundwork for the procedure and equipment necessary to provide for *tomorrow's* production requirements, are the plants that will meet this demand quickly and efficiently. Costly confusion and delay may be the penalty of procrastination; orderly production and sound profits the reward of preparedness.

For plants whose production involves machining operations, Carboloy cemented carbide is of exceptional importance in such a program. The ability of this material to increase production through higher cutting speeds (or feeds), and less downtime for tool changes, is an accepted fact established over a period of 10 years. As such, Carboloy tools are an invaluable factor not only in stepping up the productive capacity of *existing* equipment but also in obtaining maximum performance from *new* machine tools.

Past experience has shown that in each plant a period of adjustment is usually necessary in order to obtain the *full* benefits of Carboloy tool use. This is particularly true in cutting of steel with cemented carbides.

Our organization today has the manpower and time to assist you in establishing the best practice for cemented carbide use in your plant. Call upon us today to help your plant prepare to meet tomorrow's demand . . . with Carboloy tools.

CARBOLOY COMPANY, INC., DETROIT, MICHIGAN

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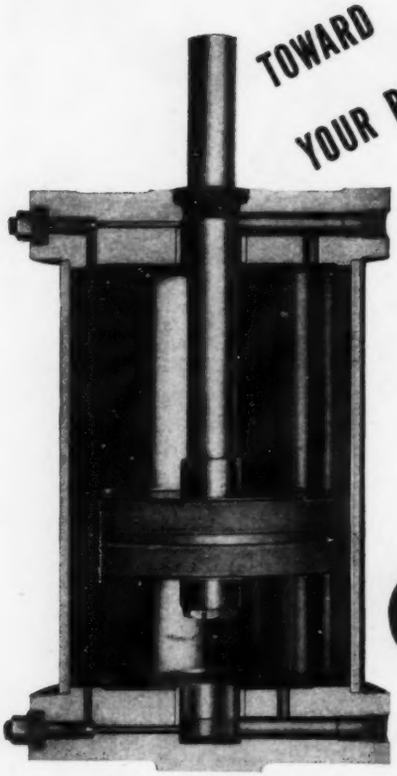
CARBOLOY CEMENTED CARBIDE TOOLS

Niagara Power Squaring Shears are built with capacities up to ¾ inch and all cutting lengths. Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y. Branches: Cleveland, Detroit, New York.

THESE photographs show the latest type Niagara High Production Power Squaring Shears being used for squaring and slitting steel sheets in America's foremost industries including aviation, automotive, electrical equipment plants, steel warehouses, steel mills, railroad shops and other plants. More working strokes per hour are the result of convenient arrangement for handling sheets . . . accessible control . . . instant acting 14-point engagement sleeve clutch with built-in single stroke mechanism . . . smooth acting toggle operated holddown with individual pressure feet for varying lengths of sheets . . . triangular section cross head assuring rigid knife support for accurate cutting . . . clutch and drive gear mounted on antifriction bearings and enclosed in oiltight case for long life and low maintenance cost . . . new self-measuring ball-bearing parallel back gage providing quick operation and micrometer accuracy.



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announces . . . .

HARD CHROMIUM PLATED

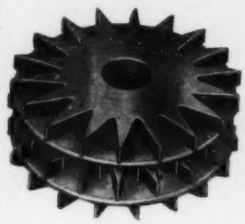
cylinder walls and piston rods

During intervals of non-use and before installation, cylinders are ordinarily susceptable to rust. From the various methods of preventing this condition, Hard Chromium plating was selected because, in addition to its ably solving the rust problem, it becomes an important factor in increasing the efficiency of the cylinder. The same moisture (from the condensation of compressed air) or water (when the cylinder is used for water-hydraulics) which would ordinarily cause corrosion, now acts as a lubricant on these hard chromium plated bodies and piston rods actually increasing the "slickness" of the surface. This in combination with the polished, smoother surface obtained means less friction and prolonged packing life. Of no less importance is the fact that these cylinders with this new feature are now being furnished *at no extra cost.*

More "service" features are described in our catalog No. 36-A. It will assist you in selecting the type of cylinder that will help you *toward your better product.*

this is a **TOMKINS-JOHNSON** *product*

Factory at 615 N. Mechanic St., Jackson, Michigan. Agents in principal cities. T-J products also include Oil Hydraulic Cylinders . . . Remote Control Systems . . . Rotating Chucks and Cylinders . . . Rivitors . . . Clinchors . . . Special Equipment . . . Brownie Coolant Pumps . . . T-J Die Sinking Milling Cutters.



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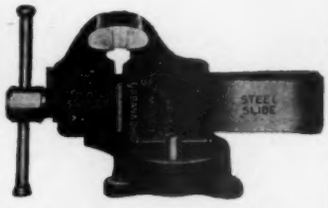
We manufacture the only complete line of Dressers and Cutters and will be pleased to advise the proper one for your wheels.

Write for copy of our catalog and name of your nearest dealer.

SIMPLEX STEEL SLIDE VISES



The exclusive solid steel slide makes these vises stronger and more serviceable.

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RAWHIDE STRIKING FACES

are easily inserted in or removed from

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BASA HAMMERS

Made in five sizes— 1⅜ to 6 lbs.

Also available with Copper and Babbitt Faces.

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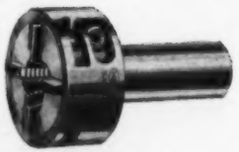
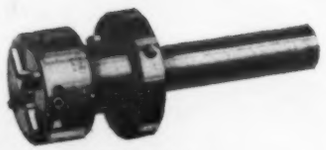
For rotary spindles

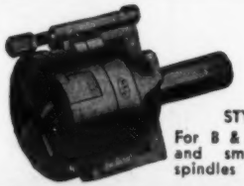
STYLE SAMA
Solid adjustable head with insert chasers for Acorn Die holders



STYLE SAM
Solid adjustable head using insert chasers



STYLE SAM
with compensating tool holder for tapping and threading at the same time



STYLE DM
For B & S Automatics and small single spindles

H&G INSERT CHASER DIE HEADS

the latest Development in Simplified Threading

Learn how insert chasers SAVE *time*, costs and *trouble* and bring you day-in-and-day-out dependable production. • • • Send for NEW BULLETINS showing how the die heads illustrated solve threading problems, ranging all the way from pipe nipples to aircraft parts.

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THE EASTERN MACHINE SCREW CORPORATION

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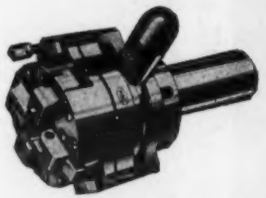
Manufacturers of

DIE H&G HEADS

THREADING MACHINES



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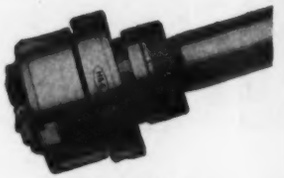
A new head for hand turret machines



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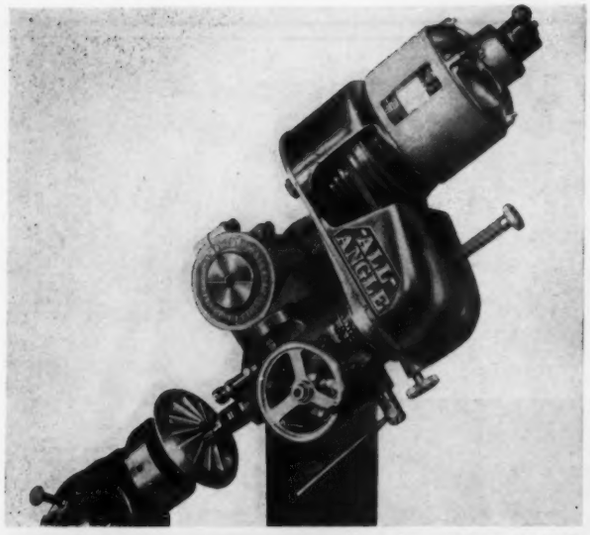
Receding chasers for superior quality taper threads

STYLE TMM*
Modification of Style TM for automatic screw machines.

*Style TM and TMM for pipe fittings meet the rigid Government Aviation Specifications.



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ALL-ANGLE
Back-Geared Milling Attachment

Does more work because it's back-geared for heavy duty...never removed from overarm...fits any mill without adapters or cradles ...handles high speed work at ANY ANGLE.

Mills • Drills • Bores • Reams
Taps • Spot Faces • Grinds

★ MORE FOR YOUR MONEY
★ DOES MORE WORK
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COMPLETE PRECISION *Type C* QUILL TYPE *At Every Angle*

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DISTRIBUTORS: A few territories are available for aggressive firms

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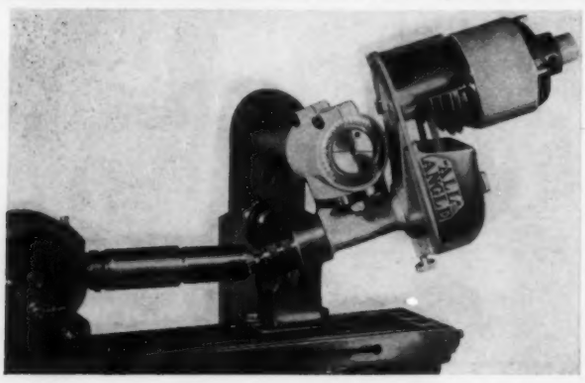

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AMES
Surface Gauge No. 22 B

With indicator graduated in thousandths inches. Ideal for use around lathes, millers, planers, shapers and drills, testing trueness, roundness, flatness, straightness, depths and heights.

Price $35.

Investigate the Savings on Your Work—*offered by*
The Hartford Super-Spacer

With this new spacing device you can handle a multitude of machining operations at speeds and feeds limited only by the capacity of the holding means and the power of the machine.

Heavy cuts in milling, drilling, slotting or planing can be made safely without impairing the accuracy of indexing. Furthermore indexing is fast and positive and without chance of error. Possibilities for savings are almost unlimited.

Substantial savings in time and money can also be made on drill jigs and layout work through the use of Drilling Attachment provided with ample adjustment for a wide range of jobs.

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It will pay you to investigate the Hartford Super-Spacer as a means of getting more and better work from your machine tools at lower cost. Full details on request.

THE HARTFORD SPECIAL MACHINERY CO.
HARTFORD, CONN.

SIZE CONTROL

at the—
NATIONAL
METAL SHOW
and in
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NEW DIAL INDICATORS—GAUGES

Booth K307
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New super-sensitive Indicators,— new Cylinder Gauges,— the new Electric Comparators,—new motorized Sorting Gauges,— new modifications of existing Gauges,—will be on display at our booth at the National Metal Show at Chicago, Oct. 23-27. You will be able to see a great many size control gauge applications that will interest you. We look forward to seeing you.

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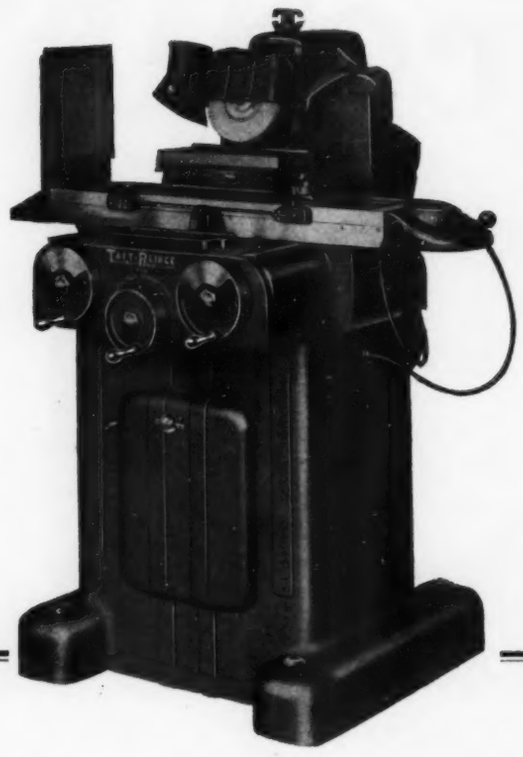

EXTENDING THE FRONTIERS
of
Precision Surface Grinding

Once in a blue moon a really *new* machine tool is developed—one which extends man's horizon, widens his field of accomplishment. Such a machine is the new Taft-Peirce No. 1 Precision Surface Grinder. Not merely another surface grinder, it is a new and different type of machine—new in its ability to produce surfaces which are really *flat* within extremely close limits of tolerance not heretofore easily attainable, new too in the long years of life which its hardened ways and ball mounting assure, new again in its effortless operation, entirely unique in its tilting wheelhead which makes the surface grinder available for difficult angle and shoulder work.

If you have a problem in maintaining the accuracy of your small surface grinders, if you are interested in extending your frontiers of readily available precision . . . *write us for Bulletin SGA.*

THE TAFT-PEIRCE MFG. CO.

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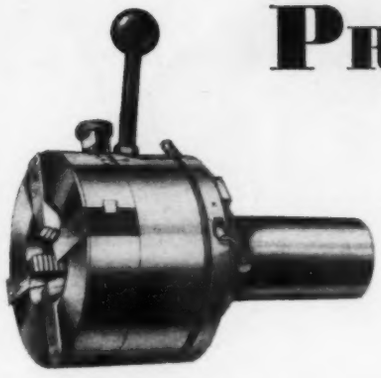
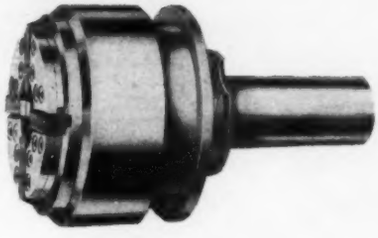
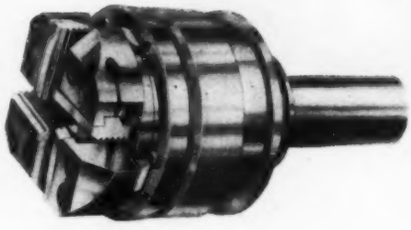
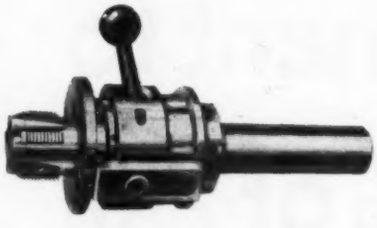
PROFITABLE THREADING









Pick out the best machine money will buy and it won't be worth a tinker's darn for threading unless you equip it with up-to-date, accurate Die Heads and Taps.

That's where Geometric comes in. Note the number of machines equipped with Geometric tools. See the wide and diversified lines of Die Heads and Taps we build. Geometric builds a tool for most every external threading job and one for most internal threading jobs over 1″.

Don't overlook that brand new line of Geometric Threading Machines—for second operation threading or work requiring threading only.

Write for details.

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See these Geometric Tools

Self Opening Die Heads
Solid Adjustable Die Heads
Taper Threading Die Heads
Collapsing Taps
Solid Adjustable Taps
Receding Chaser Taps
Threading Machines
Chaser Grinding Fixtures

THE GEOMETRIC TOOL CO.

New Haven, Conn.

Specialists in production threading tools since 1895.

by Appointment to

98% of All

Portable Tool Makers

Jacobs Chucks

THE JACOBS MANUFACTURING COMPANY
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HERE'S NEWS YOU CAN'T AFFORD TO MISS!

YOU CAN NOW GET...

STANDARDS OF ACCURACY, SPEED AND ECONOMY NEVER BEFORE ATTAINED IN A TOOL GRINDER!

IF YOU HAVE A TOOL ROOM ... OR IF YOU MANUFACTURE TOOLS...

SEND RIGHT NOW FOR FULL DETAILS

on this revolutionary

HERTLEIN

UNIVERSAL PRECISION TOOL GRINDER

Here is a radically different machine that will completely revise your conception of the accuracy, speed, economy, and breadth of application in tool grinding operations. It is especially adapted for the production of *intricately formed tools* and so far reduces the cost of grinding and forming *Tungsten-Carbide tools* that it opens up new uses for such materials not previously economical. All movements are controlled by *precision ground lead screws*, making it a combined machine tool and measuring instrument. Its super-precision spindle is capable of speeds from 5000 to 35000 r.p.m., making the use of *all sized wheels* both safe and economical. Important also is the fact that it comes *coolant-equipped* with separate motor drive. Ease of operation and speed of set-ups ideally suits it for *small lot production*. We were prepared to demonstrate this amazing machine at the Show, with ten attachments capable of handling any class of tool . . . but it's even *more* important now that you SEND FOR BOOKLET GIVING FULL DETAILS.

Address: CARL J. HERTLEIN, Designer

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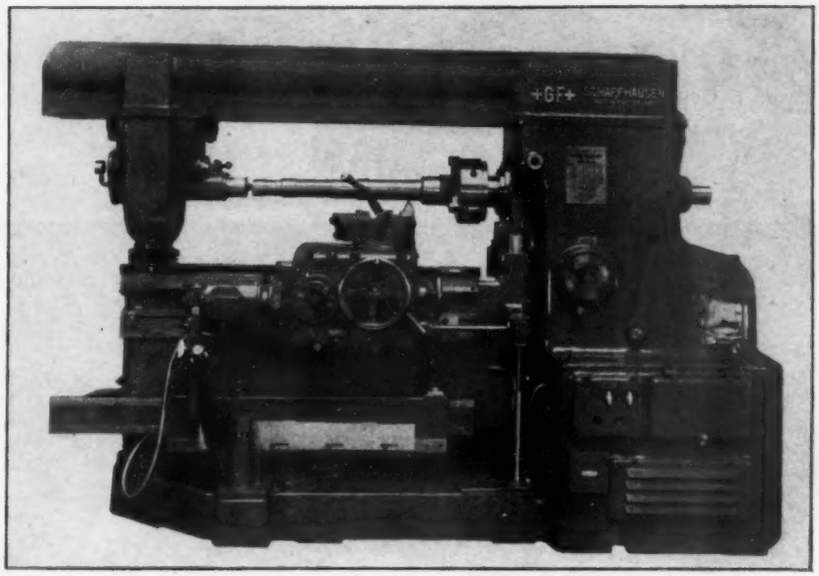
ANNOUNCING

THE "FISCHER" RIGID HYDRO-COPYING LATHE

. . . a sensationally new development for duplicating work.



This new machine—employing an easily made sheet steel templet—duplicates work with varying diameters, tapers and contours. Parts of alloy steel such as shafts for gear boxes, electric motors, pumps, fans and similar work can be produced with great accuracy and speed; and with large savings in setting up, controlling and checking.

The unique and rigid construction of the "Fischer" Duplicating Lathe makes it possible to use the cemented-carbide tipped tools to the fullest extent, with long life of the cutting tools on account of elimination of vibration; resulting in very large output and accuracy. The chips fall to the rear of the lathe.

The vertical movement of the knee, which carries the tool and which is guided by the column and pillar, is controlled hydraulically by the tracer following the contour of the templet. The tool is set to the various diameters automatically and accurately, so that operation of this lathe is extremely simple.

Maximum work diameter 11¾ in.; maximum swing 19¼ in.; maximum length between centers 39⅜ in. Write for full specifications and complete details.

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ACCURACY ECONOMY USABILITY 3

THREE MAJOR FACTORS THAT SHOULD CONTROL THE PURCHASE OF GAGE BLOCKS

All 3 factors are combined in The DEARBORN GAGE CO., new and reconditioned CHROME PLATED GAGE BLOCKS—their superiority over the old style gage is accepted.

It costs much less to use Chrome Plated Gage Blocks, maintaining accuracies in millionths, than any other gage.

WHERE ACCURACY IS INDISPENSIBLE— CHROME PLATED GAGE BLOCKS ARE INCOMPARABLE

DEARBORN GAGE COMPANY

"Originators of Chromium Plated Gage Blocks"

22036 BEECH STREET DEARBORN, MICH.

HOURS or MINUTES for Grinding and Fitting Contours

? ? ?

In making your estimates do you have to allow for hours and hours of slow hand work when the job calls for grinding and fitting irregular shapes and difficult contours?

Boyar-Schultz Profile Grinders in your shop make it possible for the highly skilled men in your employ to give the best of their ability. They are able with the help of these machine tools to do in MINUTES, work that formerly took HOURS — and they can do it BETTER.

BOYAR-SCHULTZ HEAVY DUTY GRINDER No. 2 with the new MULTIPURPOSE HEAD was designed and developed by tool engineers who are thoroughly familiar with the every-day problems of the tool and die maker and the builder of special machines.

It is a smooth running Machine Tool that efficiently handles tool and die work of larger and more difficult types. With it, heel or base punches can be ground in full view. All controls are located to operate conveniently from the front; large table tilts 10°; 2 H.P. ball bearing mounted Motor turns either spindle at approximately 10,000 R.P.M. with vertical oscillations of 100 per minute. It is a clean, rapid stock remover even with wheels of small diameter.

BOYAR-SCHULTZ PORTABLE PROFILE GRINDER No. 1 is not only solving contour grinding and fitting problems in hundreds of shops in this country and abroad, but its users are continually finding new applications that establish it as a real TIMESAVER. Operates at approximately 20,000 R.P.M.

Write for Complete Descriptive Literature

BOYAR-SCHULTZ CORPORATION

2110 Walnut St., Dept. A Chicago, Illinois

The GRANT

1939 MACHINE TOOL SHOW

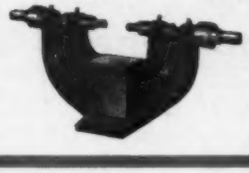
The right type of machine for every job and each machine the best of its type

GRANT NOISELESS RIVET SPINNING MACHINES

TODAY'S highest development of the famous blowless, noiseless method that has been cutting costs, speeding production and improving product quality for the past 32 years. Unquestionably the fastest and most accurate known method for a broad range of production assembly. Speed is limited only by the operator's dexterity in feeding. Tension of rivets under precise control. Grant equipment embodies every picture for constant high speed operation. Let us demonstrate on your own work. Send samples for free production analysis.

Pedestal type, vertical motor drive, capacity 7/32" throat 5 3/8".

Typical bench type vertical motor drive machines, capacity 3/32" throat 2 1/8" and bench type, belt-drive two spindle machine, capacity 3/32" steel or iron, 1/8" brass, bronze, etc.



FASTEST KNOWN METHODS FOR PRODUCTION MANUFACTURING

GRANT DOUBLE-END AUTOMATIC CHAMFERING MACHINE

THE operations performed by this machine are facing, boring, chamfering, centering, counterboring, countersinking and drilling the opposite ends of bushings, rods, spindles, or work of that general character. Both ends are operated simultaneously and each end may perform the same or different operations. The machine is fully automatic. The magazine is adjustable for all diameters and lengths within the capacity of the machine. Can also be furnished with Hopper Feed. Machine may be set up for different operations in about 30 minutes. One operator can attend to 2 or 3 machines, depending on class of work and rate of production.

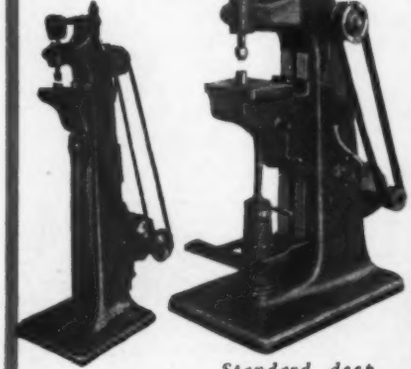
Made to work in three lengths —3", 6½", 11". Cut shows machine equipped with Hopper Feed.

GRANT ROTARY VIBRATING RIVETERS

MANY new features and aids to high speed operation make Grant the outstanding line of vibrating riveters on the market today. Riveting tools butt solidly against lower end of spindle to insure a snappy positive blow, and are made from hexagon stock to permit easy removal with a wrench. Rotation of the hammer prevents loosening of the tools in operation.

Grant Vibrating Riveters are made in all standard single and multiple spindle types from 3/32" to 3/8" and in special forms to meet all requirements. Send us samples of your own work for free analysis.

Bench type Vibrating Hammer, capacity 1/8".

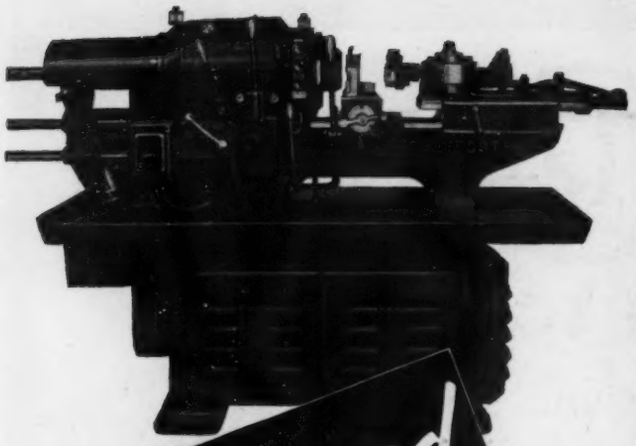


Standard deep throat heavy duty pedestal type machines. Capacity to 3/8".

The Grant Manufacturing and Machine Co.

85 Silliman Ave., Bridgeport, Connecticut, U. S. A.

NEW YORK OFFICE	DETROIT OFFICE	CLEVELAND OFFICE	CHICAGO OFFICE
30 CHURCH STREET	19 WEST WOODBRIDGE ST.	PENTON BUILDING	30 NORTH CLINTON ST.



Improved SCREW MACHINE WITH MOTOR IN BASE

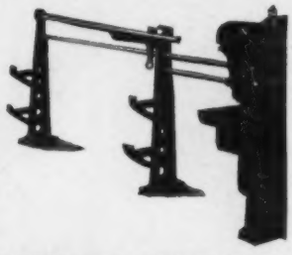
This improved Screw Machine is now in use by scores of America's leading manufacturers. In both large plants and small it has proved its marked superiority over older type machines which require a special motor mounted on the spindle. The No. 1 Foster Screw Machine has a standard motor installed in the base and drives through a transmission. Since the spindle drive is entirely gearless, the operation is quiet and smooth—without vibration. All chatter is eliminated from spindle.

INSTANTANEOUS SPINDLE SPEED CHANGE 8 SPEEDS 300 TO 3600 R. P. M.

8 spindle speeds—all dial selected. Instantaneous spindle speed change from high to low range, or low to high range, offers big advantage when changing from turning to threading or reaming speeds and back to turning. Feed fingers feed bar up to end of collet. Turret is automatically unclamped by means of ring type binder, indexed and reclamped by movements of turret slide.

AUTOMATIC CHUCK AND BAR FEED

The automatic chuck and bar feed are mechanically-operated. A slight push on the engaging lever results in collet being released, bar fed forward against stop and collet closed—a big saving in operating effort and machining time. The bar is supported in a tube and fed forward by means of feed fingers. Bar tube supports are also a bar rack and will accommodate from ten to twelve different bars in separate places.



SPEEDS PRODUCTION CUTS COSTS

The ideal machine for work up to 1-1/16". Designed to fit modern production conditions. You will find it a distinct time and money saver. Built to the high quality standards for which all Foster machines are famous. Complete facts and latest literature gladly furnished on request.

Write FOR FREE BOOKLET

FOSTER MACHINE COMPANY
902 FOSTER BUILDING, ELKHART, INDIANA

FOSTER

Now.. Many Baffling Finish Problems Disappear

NEW WET BELT GRINDING METHOD

PORTER-CABLE *Wet-r-Dry* GRINDER

Gone entirely is all danger of heating, discoloring, fracturing, chipping and warping of materials. "Wet-r-Dry" enables you for the first time to put many difficult finishing and polishing operations on "line" production—hand work eliminated. It cuts faster and cleaner, eliminates dust, washes abrasive free from fill-up, keeps belt usable longer, gives straight-grain finish. Built to maintain continuous, capacity output all day, every day.

Here is the chance to get the finish you want, in the time you set. Let "Wet-r-Dry" show the way to lower costs. Send samples with finish data, for definite cost-reducing recommendations—without obligation.

●

BE SURE TO WRITE

for further information on the latest wet grinding equipment, lapping machines and production sanders, that give big economies in Time and Money.

SAVES
GRINDING COSTS On
Stainless Steel, Brass, Aluminum, Steel, Lead, Glass, Marble, Bone, Plastics, Celluloid, Hard Rubber, Bakelite, Ceramics, Terrazza, Asphalt Tile, Stone.

PORTER-CABLE MACHINE CO.
1725 NO. SALINA ST., SYRACUSE, N. Y.

NEW G-E REVERSING PLANER DRIVE

Variable-Voltage Type

CINCINNATI HYPRO DOUBLE HOUSING PLANER equipped with the new G-E variable-voltage planer drive, consisting of the items indicated by numbers.

1. **D-c planer motor with forced ventilation**
2. **Separate rheostats for cut and return. These, with resistors, can also be mounted in a cabinet identical with No. 6**
3. **Pendant-type push-button station**
4. **Multi-conductor control cable**

5. Heavy-duty limit switch

6. Variable-voltage planer control. Note its simplicity

7. Close-coupled motor-generator set

Note these features

Wide speed range—both cut and return; exceptionally fast but smooth acceleration and deceleration; a large number of reversals per minute on short stroke; good speed regulation; high cutting efficiency—these are some of the principal advantages of the new G-E variable-voltage reversing planer equipment.

Simplified control!

The value of the co-ordination of *all* the electric equipment by *one* manufacturer is well exemplified in the new drive. Each part is specially designed to fit the characteristics of the other parts. The characteristics of both the motor-generator set and the motor are such that they work together to give the benefits outlined above.

As a result of this matched design of the rotating equipment, the control has remarkable simplicity without sacrifice of desirable operating features.

See it at Show

Plan now to see this new G-E variable-voltage drive in operation on a planer at the Machine Tool Show in Cleveland. For more information on it, call the nearest G-E office or write General Electric Co., Schenectady, N. Y., for our new bulletin, GEA-3285.

SEE THE LATEST IN MACHINE TOOLS AND G-E EQUIPMENT at the MACHINE TOOL SHOW

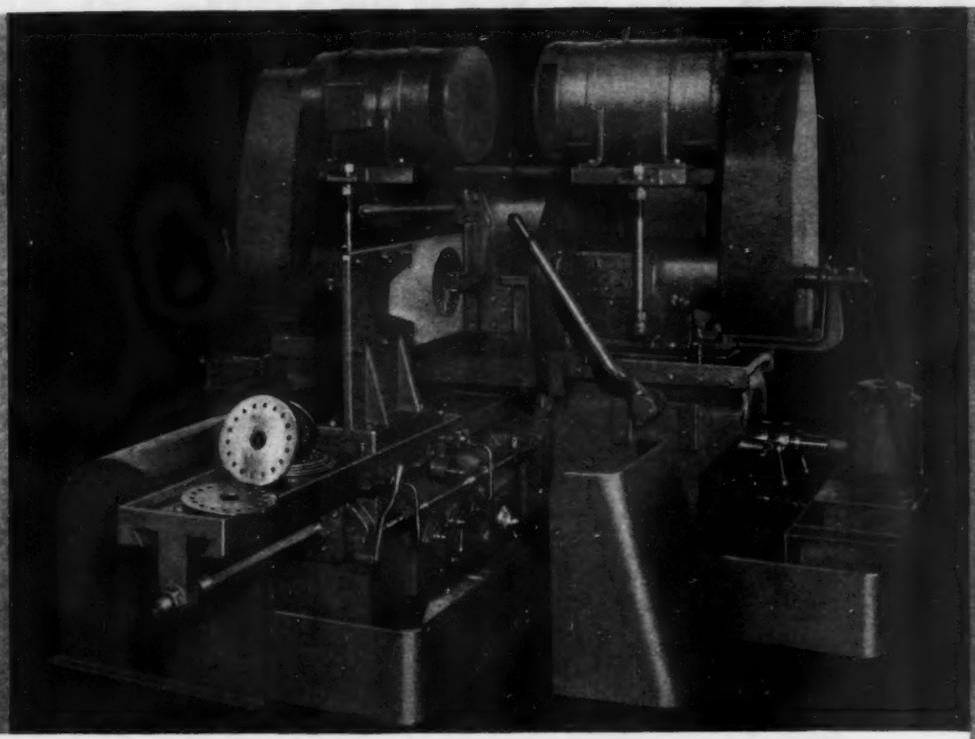
Visit the G-E Exhibit of WHAT'S NEW IN ELECTRIC EQUIPMENT

FOR PROFITS MACHINE TOOL SHOW
CLEVELAND
OCT. 4 to 13, 1939

GENERAL ELECTRIC

011-510

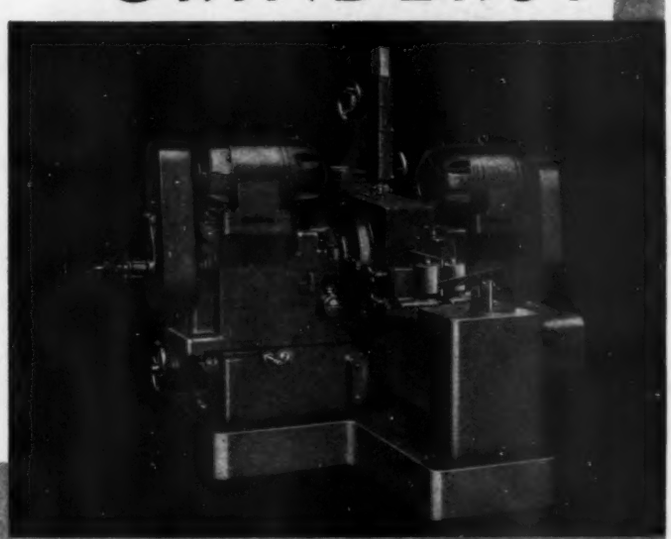
SEE



PRECISION Disc Grinding
performed at Cleveland
on GARDNER GRINDERS!

PRECISION Disc Grinding is still new to many Production Officials; holding parts within a few "tenths" on a Disc Grinder has been possible only for a relatively brief period.

In our Booth at Cleveland (No. 5212), you will see two Precision Double Head Grinders in actual operation. You will also see several late-model standard Grinders, as well as a full display of heavy WIRE-LOKT Abrasive Wheels, to which the remarkable possibilities of the present-day Gardner Grinder are largely due.



FOR PROFITS
MACHINE
TOOL SHOW

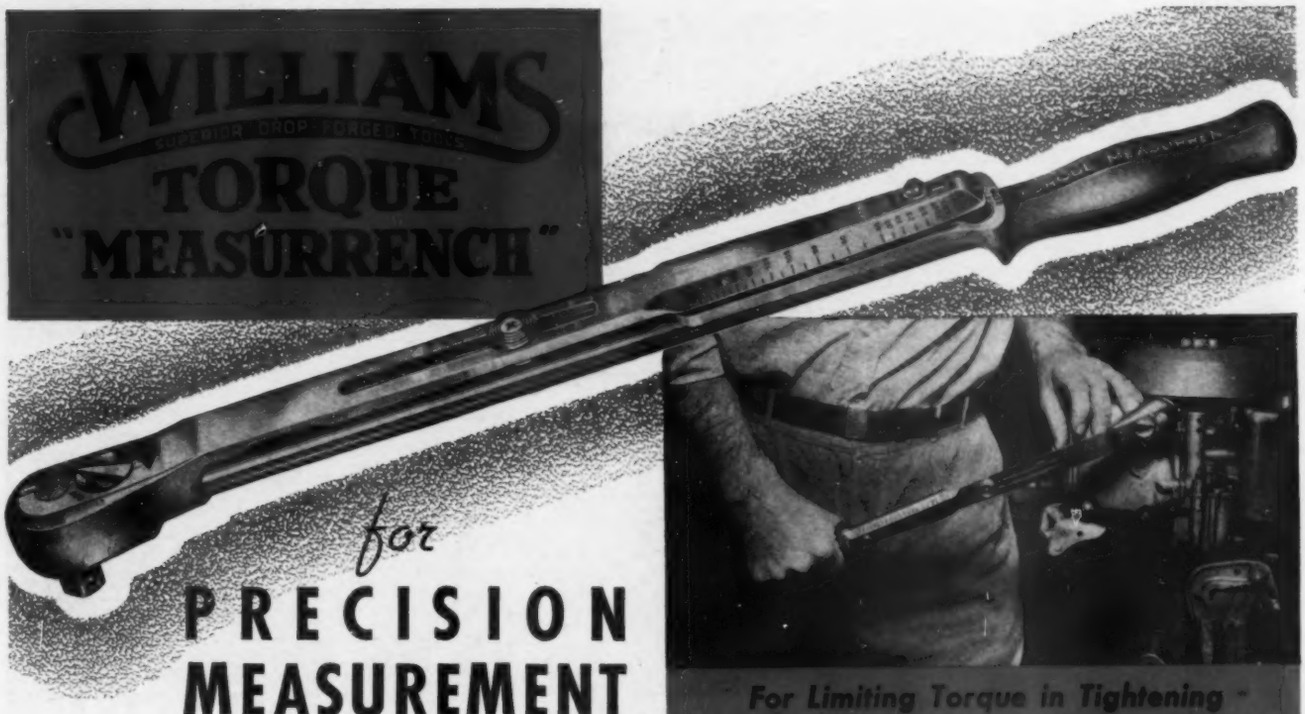
CLEVELAND
OCT. 4 to 13, 1939

VISIT
BOOTH 5212!

GARDNER MACHINE CO., 410 E. Gardner St., BELOIT, WIS., U. S. A.

WILLIAMS
SUPERIOR DROP FORGED TOOLS

TORQUE "MEASURRENCH"



for

PRECISION MEASUREMENT *of* TORQUE LOADS

Wherever closely limited torque application is essential, Williams' new Torque "Measurrench" #S-57 provides the answer in terms of a precision tool at moderate price. Although designed especially for use with Williams' standard "Supersockets" it can be used with any detachable socket having 1/2" square drive-opening.

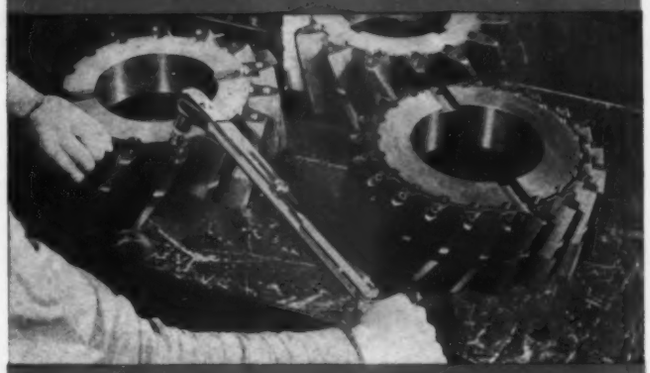
#S-57 combines new mechanical features with unusually rugged construction. Accuracy does not depend on delicate gears, levers, or dials but upon heavy sections of high-tensile steel. Right-hand torque is measured, and the wrench action reverses for left-hand turning. Williams' patented construction makes possible the unusually short operating swing of only 1/30 of a full turn.

Torque loads are measured either by *sight reading* or by *sound signal* for any desired torque to 200 foot-pounds.

Every part is made of alloy and high-tensile steel, accurately machined and scientifically heat-treated. Finished in chrome-plate with "satin" chrome handle. Over-all length, 19½". Every Torque "Measurrench" is fully guaranteed. Ask your mill supply distributor, or write for illustrated literature.

1-583A

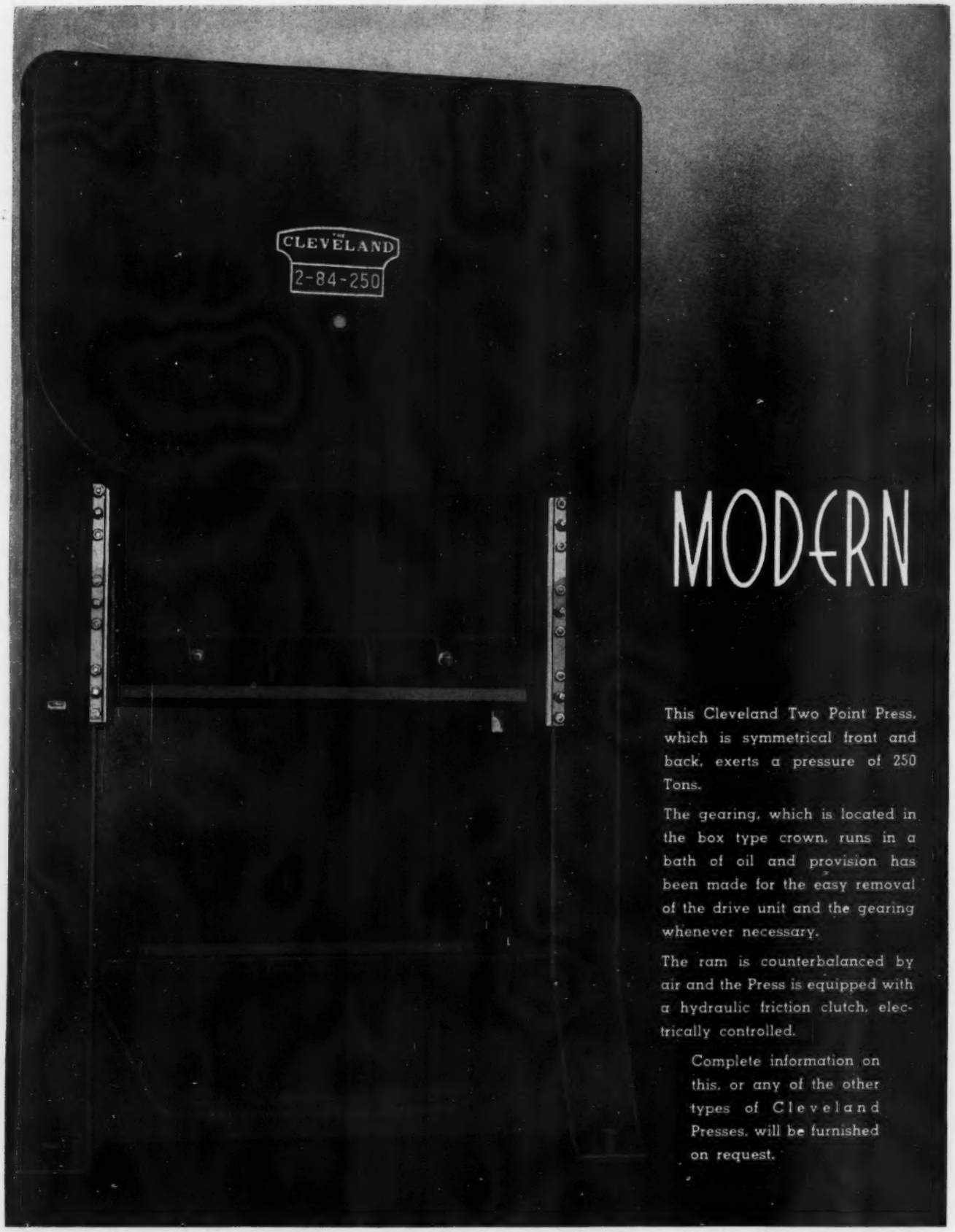
For Limiting Torque in Tightening
DIE CAST ALLOY METAL PARTS



For precision measurement of
TORQUE LOADS IN EXACTING WORK

For all Applications requiring
EQUAL TENSION ON NUTS, STUDS, ETC.

J. H. WILLIAMS & CO. — HEADQUARTERS FOR — 225 LAFAYETTE ST., NEW YORK



MODERN

This Cleveland Two Point Press, which is symmetrical front and back, exerts a pressure of 250 Tons.

The gearing, which is located in the box type crown, runs in a bath of oil and provision has been made for the easy removal of the drive unit and the gearing whenever necessary.

The ram is counterbalanced by air and the Press is equipped with a hydraulic friction clutch, electrically controlled.

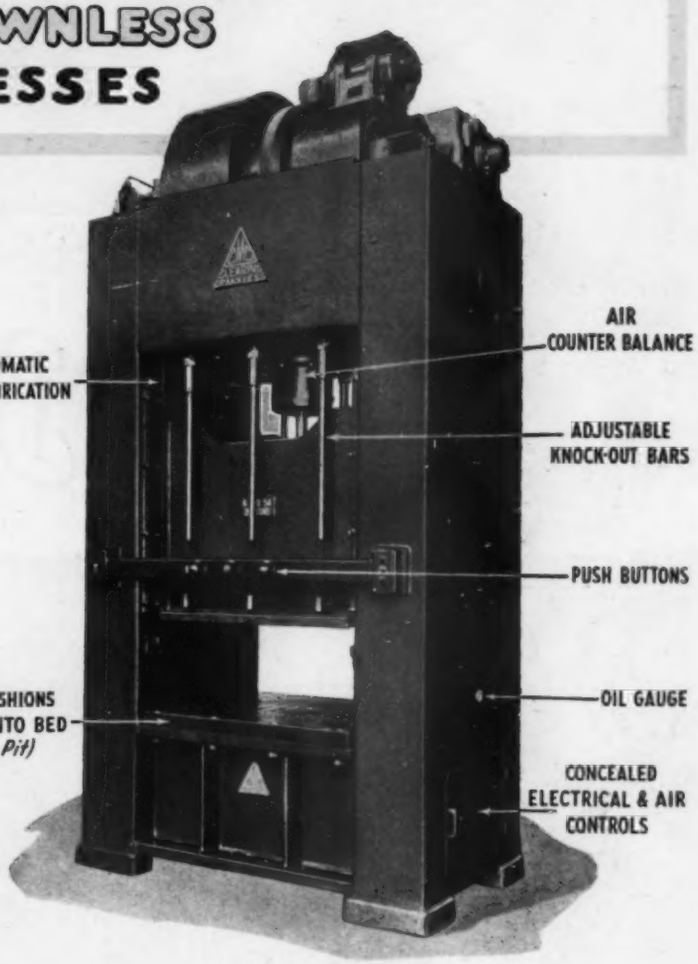
Complete information on this, or any of the other types of Cleveland Presses, will be furnished on request.

Modern Presses **THE CLEVELAND PUNCH & SHEAR WORKS COMPANY** *Cleveland, Ohio*

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

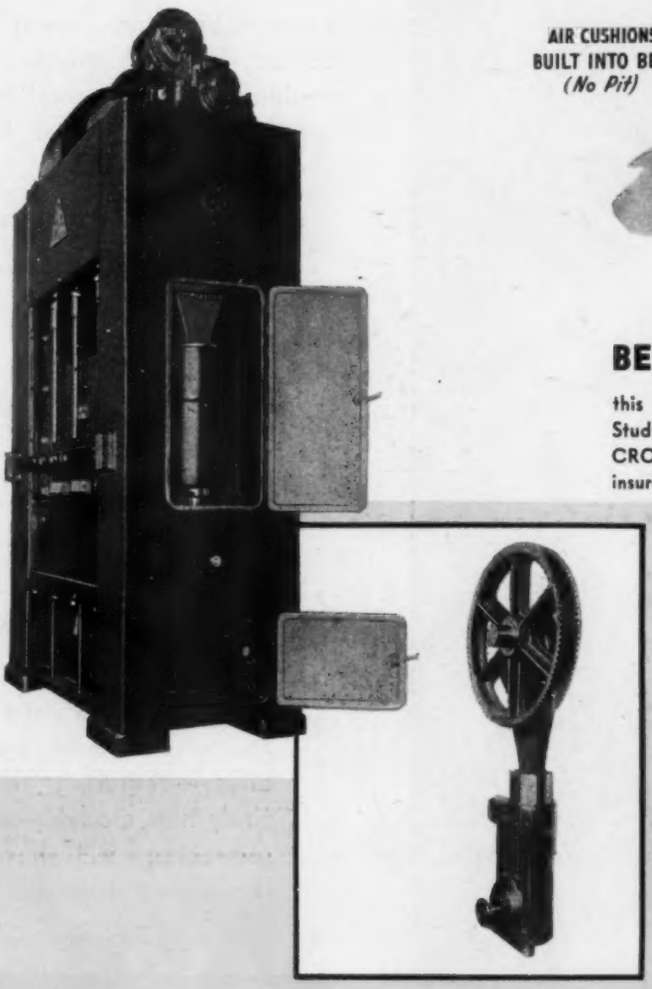
CHECK THESE
CROWNLESS
PRESSES

CLEARING



. . . . FEATURING

- CRANKSHAFTLESS CONSTRUCTION—
- NO CROWN DEFLECTION
- CUSHIONED BEDS—
- ROTATING PARTS BATHED IN OIL



BE SURE AND CHECK

this new type precision equipment before buying presses. Study the construction and you'll appreciate why CLEARING CROWNLESS PRESSES, made of steel and without crankshafts insure:

100% freedom from broken Crankshafts
100% freedom from burned out bearings
Absolute protection against broken crowns
Elimination of need for pits
Greatly increased utility
Lower cost of operation

Let us show you how these and other advantages are achieved in CLEARING POWER PRESSES. Write us for information.

CLEARING
MACHINE CORP.
CHICAGO AND DETROIT

What's NEW in DRILLS and

"Buffalo" GIVES YOU THE ANSWER

You'll save time and money on your punching, shearing, slitting with this Buffalo Universal Iron Worker.

If you've been wondering how to lower your metal fabricating costs —you'll find the answer in the Buffalo line of metal working equipment which was to have been displayed at the Machine Tool Show.

—A complete line of bending rolls—for cold bending structural shapes into circles, spirals, arcs.

—Billet Shears for cutting forging stock.

—Universal Machines for punching, shearing, and slitting angles, tees, beams, flats, plates, in fact, almost any shape.

—And last but far from least—the Buffalo line of production drills — featuring three entirely new models—which we guarantee will have your unqualified approval.

"Buffalo" UNIVERSAL IRON WORKERS

Built to the Highest

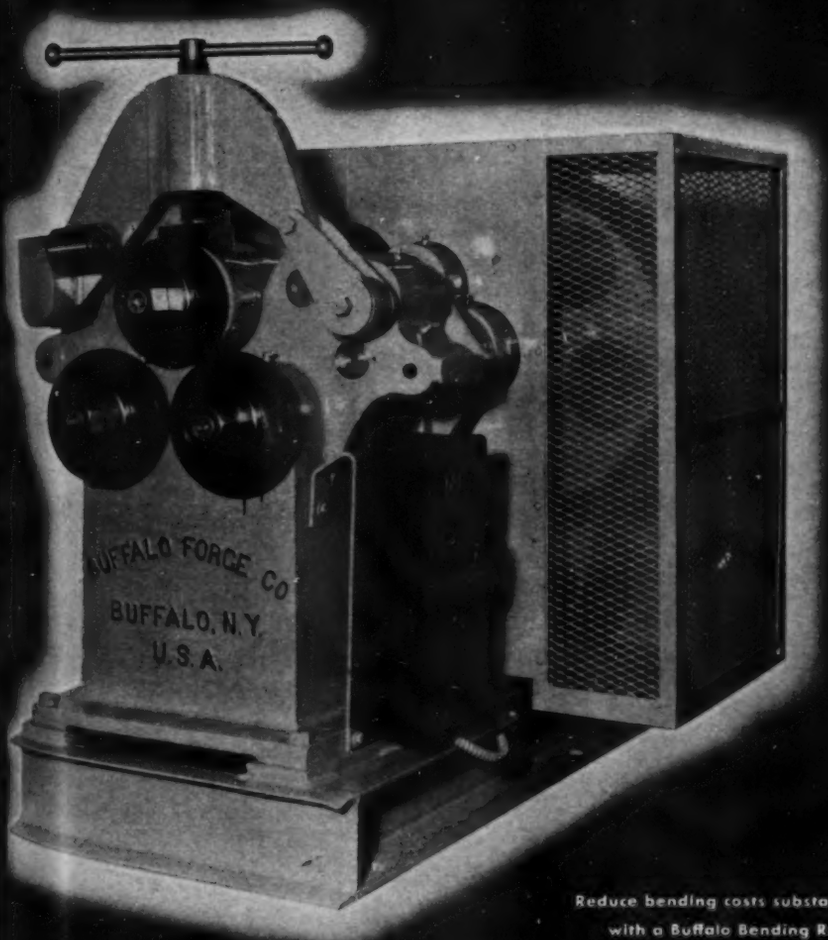
IRON WORKERS BENDING ROLLS?

Complete bulletins on all these machines are available—ask for yours now!

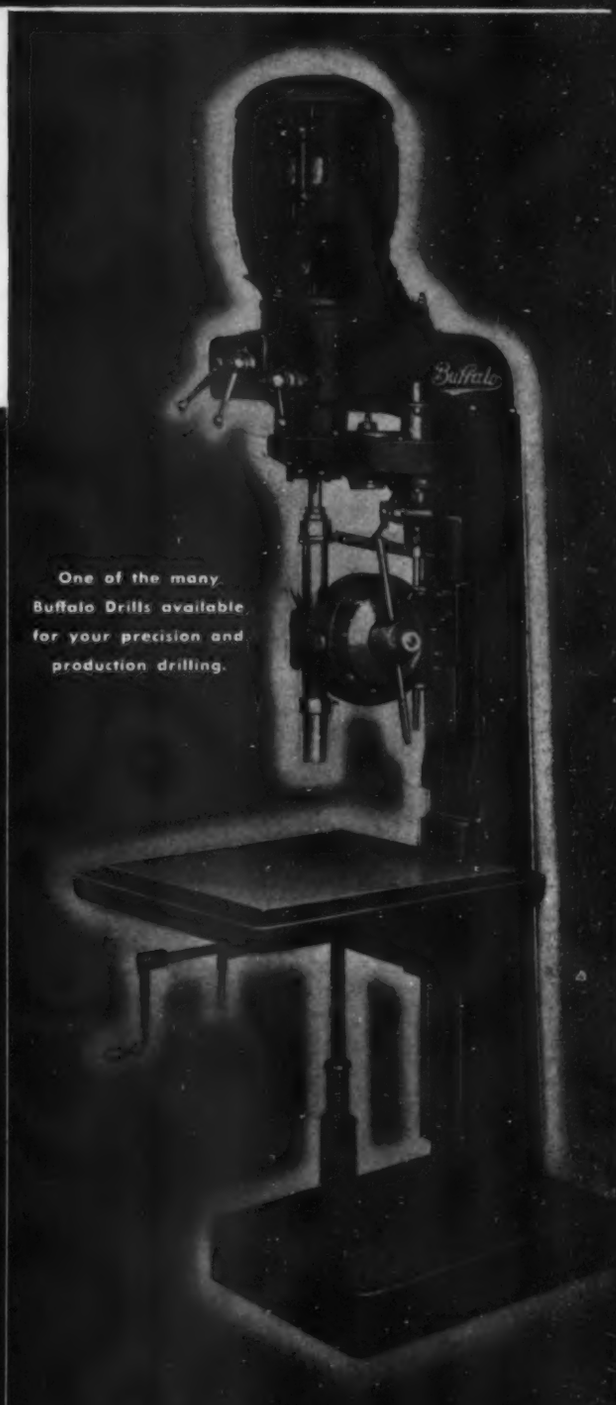
BUFFALO FORGE COMPANY

448 Broadway **Buffalo, N. Y.**

Canadian Blower & Forge Co. Ltd., Kitchener, Ont.



Reduce bending costs substantially with a Buffalo Bending Roll



One of the many Buffalo Drills available for your precision and production drilling.

BENDING ROLLS AND DRILLS

Machine Tool Standards

MORE PRECISION WORK W

Rivett No. 1020
Precision Toolroom
Cabinet Lathe

Rivett No. 715
Enclosed Sensitive
Precision Bench Lathe

SPECIFICATIONS

Rivett No. 1020 Precision Toolroom Cabinet Lathe

Type of Work—precision, toolroom, manufacturing, laboratory and instrument. High speed straight and taper turning, thread-cutting, boring and facing.
Spindle—super-precision preloaded ball bearing, long taper key-drive nose, 1" collet capacity.
Swing over bed—10".
Distance between Centers—20".
Steel Cabinet—with Submarine Signal Company Variable Speed Drive. Spindle speeds 20 r.p.m.—2500 r.p.m.

Rivett No. 918 Enclosed Heavy Duty Precision Bench Lathe

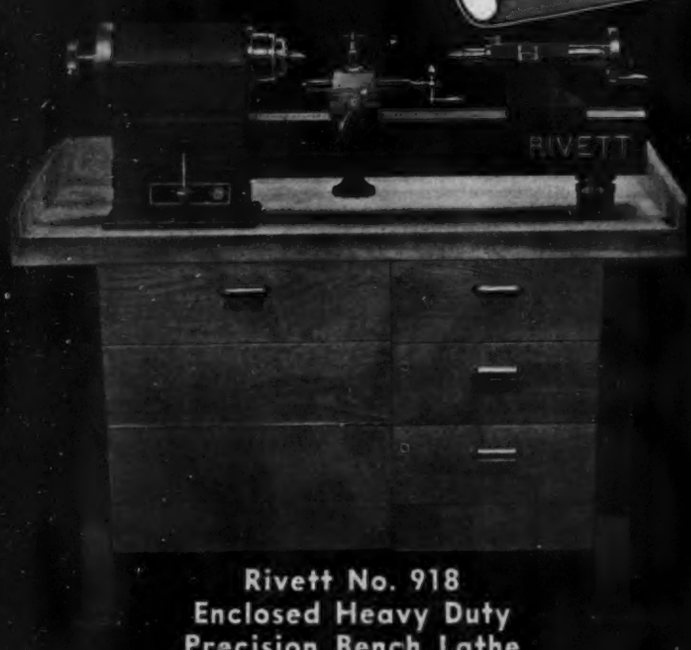
Type of Work—high speed manufacturing, toolroom and instrument.
Spindle—super-precision preloaded ball bearing, long taper key-drive nose, 1" collet capacity.
Swing over Bed—9".
Distance between Centers—18".
Composite Bench-Cabinet—with single lever electrical control multi-speed vee-belt drive. Spindle speeds 150 r.p.m.—3750 r.p.m.

Rivett No. 715 Enclosed Sensitive Precision Bench Lathe

Type of Work—small instrument, laboratory and repair. Highest speed turning, boring, facing, drilling, grinding, manufacturing.
Spindle—super-precision preloaded ball bearing, long taper key-drive nose, ⅝" collet capacity.
Swing over Bed—7".
Distance between Centers—15".
Bench—with pedestal-mounted motor jack-shaft drive, single lever electrical control, vee-belt, multi-speed up to 5000 r.p.m.

Rivett No. 918 Enclosed Precision Hand Screw Machine

Type of Work—manufacturing small duplicate parts from bar stock, maximum diameter 1", and second operation work held in collet, step or jaw chuck.
Spindle—Super-precision preloaded ball bearing, long taper key-drive nose, push-out or draw-in collet, ball bearing rotary chuck closer.
Swing over Cross Slide—3½".
Travel of Turret Slide—4½".
Oil Pan Stand—with speed box motor drive, 220 r.p.m.—2000 r.p.m. and oil pump with piping.



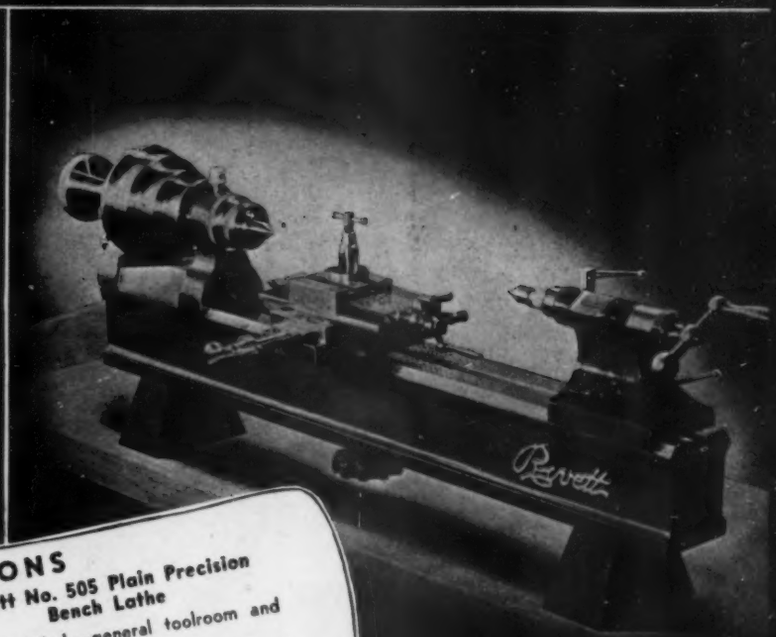
Rivett No. 918
Enclosed Heavy Duty
Precision Bench Lathe

Rivett No. 918
Enclosed Precision
Hand Screw Machine

RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

K WITH RIVETT MACHINES

RIVETT No. 104
Internal Grinder



RIVETT No. 505
Plain Precision
Bench Lathe

SPECIFICATIONS

Rivett No. 104 Internal-External Grinder

Type of Grinding—straight and taper holes and bevels.
Grinding Capacity—3" hole diameter—up to 3" outside diameter.
Automatic Table Travel—1/4" to 2" or 1/2" to 4".
Swing over Table—8".
Collet Capacity—7/8" max. diameter.

Rivett No. 608 Back Geared Precision Screw-Cutting Lathe

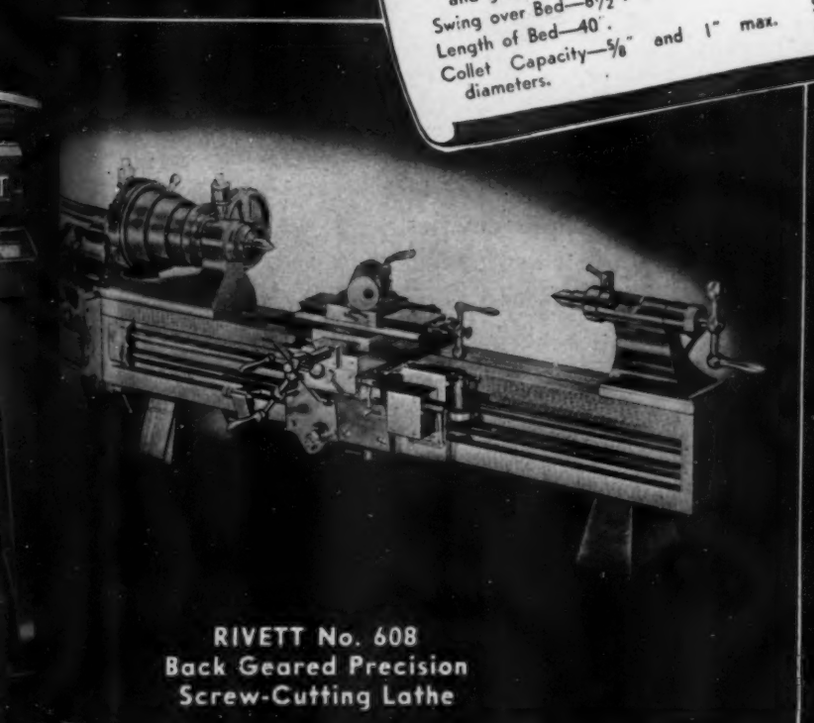
Type of Work—straight, taper and ball turning, boring, facing, milling, threading, spiral cutting, slotting, relieving and grinding.
Swing over Bed—8 1/2".
Length of Bed—40".
Collet Capacity—5/8" and 1" max. diameters.

Rivett No. 505 Plain Precision Bench Lathe

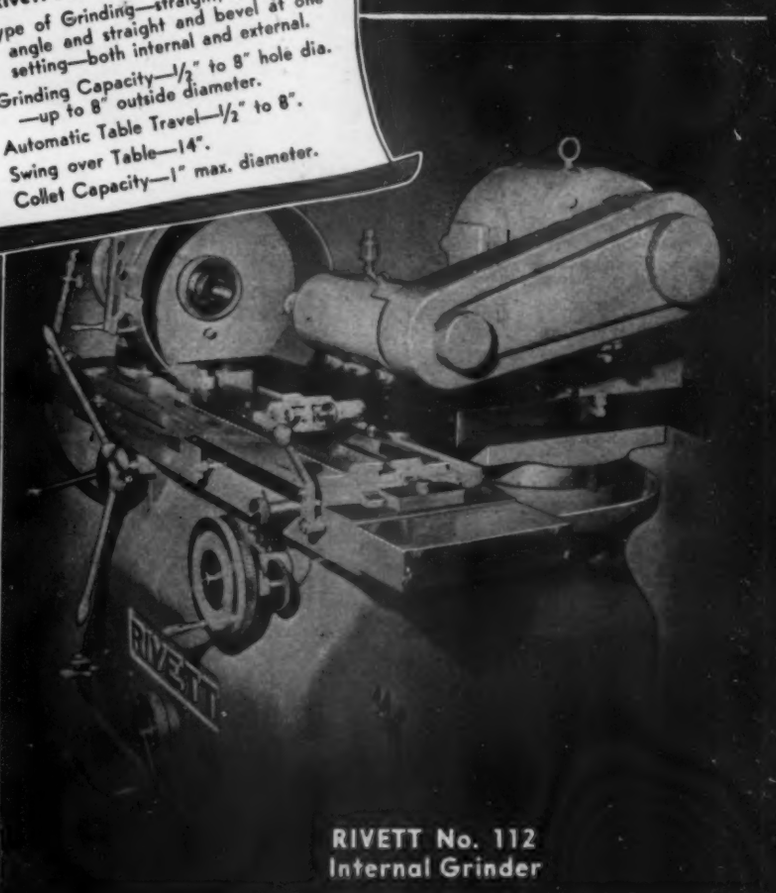
Type of Work—general toolroom and manufacturing.
Spindle—mounted on bronze, roller or ball bearings.
Swing over Bed—8".
Length of Bed—38".
Collet Capacities—1/2"-1 1/8" max. diameters.

Rivett No. 112 Universal Grinder

Type of Grinding—straight, bevel, two angle and straight and bevel at one setting—both internal and external.
Grinding Capacity—1/2" to 8" hole dia. —up to 8" outside diameter.
Automatic Table Travel—1/2" to 8".
Swing over Table—14".
Collet Capacity—1" max. diameter.



RIVETT No. 608
Back Geared Precision
Screw-Cutting Lathe



RIVETT No. 112
Internal Grinder

C. RIVETT LATHE & GRINDER INC.
BRIGHTON, BOSTON, MASS.

OUR *Regrets*

We regret that the National Machine Tool Show has been postponed and that we cannot show you our two latest developments which were to be in operation in our exhibit space.

★ NEW GORTON MASTERMIL!

Most important feature of this exhibit would have been the first showing of our new MASTERMIL, designed for duplicating multiple cavities, and die sinking of single cavities on work as large as 30 inches square. This machine has increased adaptability, capacity, and convenience in working plastic molds, die castings and forging dies, large metal patterns, and tool work.

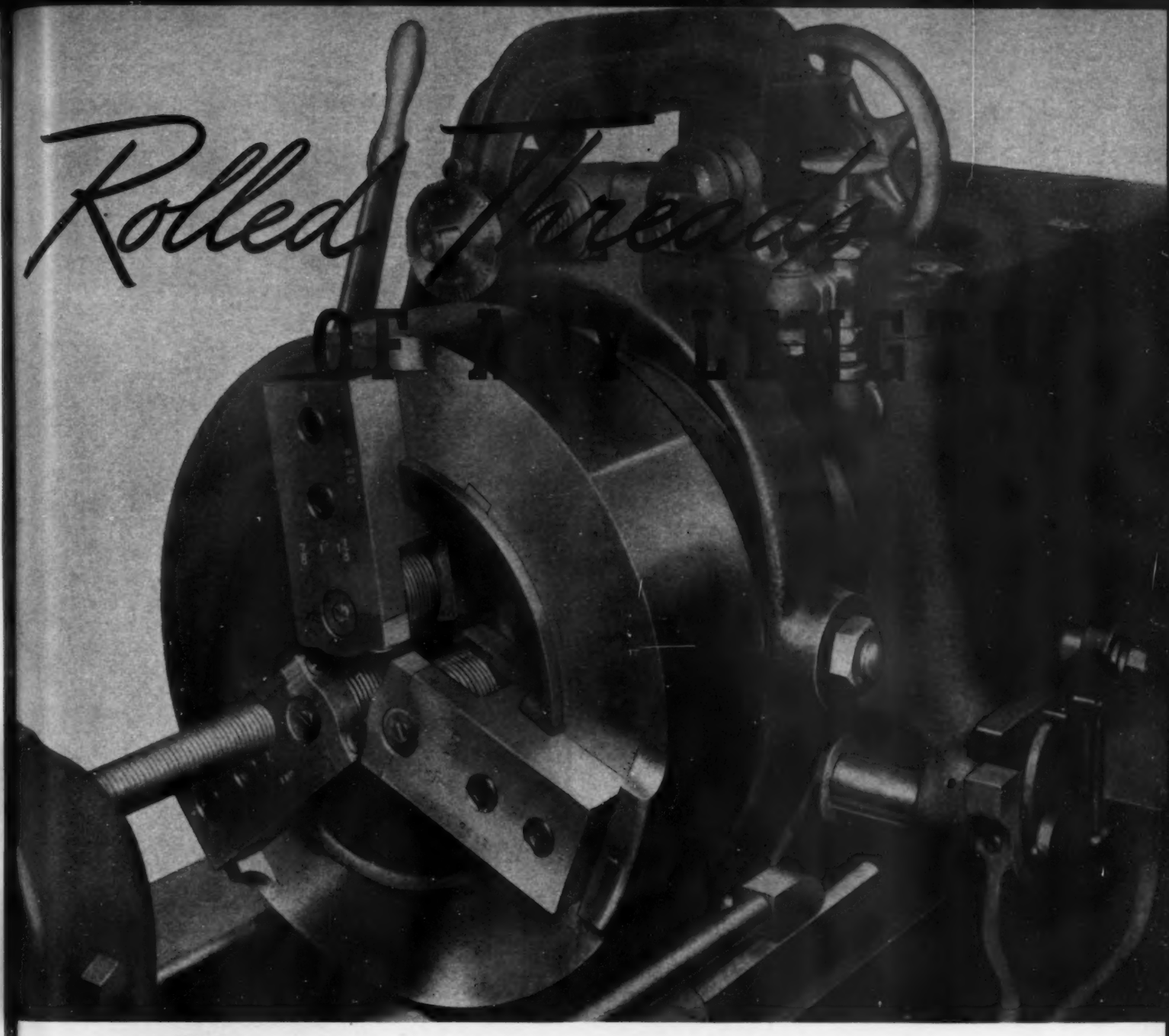
★ NEW SUPER-SPEED UNIVERSAL MILLER!

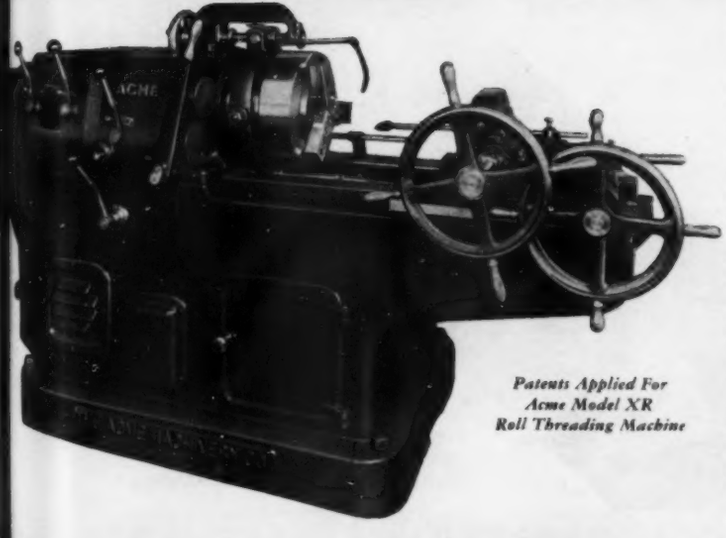
Another recent development is the new Gorton 8½-D Universal Miller which retains the desirable features of our previous model with several important improvements.

NUMBERS in photograph identify Gorton machines. 1, MASTERMIL No. 15-B; 2, 3, 4, and 5 are Gorton Super-Speed vertical millers and duplicators, including the new Universal Head Model; 6, cutter grinder; 7, 8, and 9 are two and three dimensional pantographs. WRITE FOR COMPLETE DETAILS.

GEORGE GORTON MACHINE CO.

1103 13th STREET, RACINE, WIS.





Patents Applied For
Acme Model XR
Roll Threading Machine

● Yes, and on a production basis with the new, revolutionary ACME Roll Threading machine, Model XR. This is the much-whispered-about new machine tool just added to the long line of ACME thread cutting machines, coupling and nut tapping machines, forging and bolt and nut machines on which the good name of this company has been built over a period of 60 years. And this new Acme machine is as good as the others—as soundly constructed, as well engineered, and as profitable to use.

MODEL XR SAVES MATERIAL—size of stock used is the same as the pitch diameter of thread rolled—a saving in material of as much as 15%.

MODEL XR SAVES TIME—speed of rolling, somewhat higher than that of cutting threads, amounting to 15% to 50% increase.

MODEL XR IS ACCURATE—finished work from this machine achieves a degree of accuracy seldom attained in threading equipment. Action of rolls imparts slight surface hardness which strip tests show to be about 15% stronger than cut threads. Tolerances easily held within thousandths.

It will be well worth your while to see this surprising new machine tool now or at any other time convenient to you, at our plant, since exhibition at the Machine Tool Show has been postponed indefinitely.

THE ACME MACHINERY COMPANY

Established 1882

4535 ST. CLAIR AVENUE

FORGING · THREADING · TAPPING

Cleveland Ohio

7 money saving features

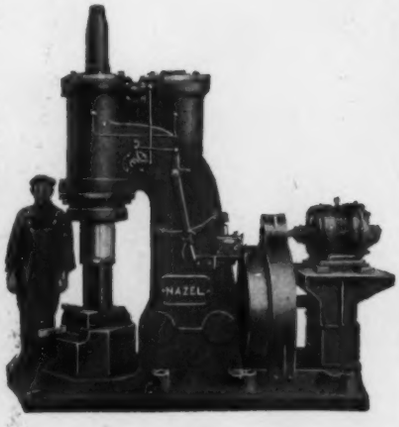
Nazel Forging Hammers are entirely self-contained units . . . need no separate motor, compressor, air storage tank or piping . . . can be placed anywhere that current is available . . . can be operated independently any hour of the day or night.

Who use them?

More than 1100 leaders in 67 industries use Nazel Hammers for mass production, for commercial forging and for plant maintenance work.

Investigate the advantages that have given the Nazel Hammer an international reputation for good service. Details on request; no obligation!

1. SELF-CONTAINED—Hammer, Motor, Compressor all in one!
2. CONSUMES POWER ONLY WHEN OPERATING!
3. GIVES A POWERFUL SQUEEZING BLOW!
4. POSITIVE IN ACTION!
5. SIMPLY CONTROLLED!
6. HEAVY, RIGID, DURABLE CONSTRUCTION!
7. EFFICIENT—Fewer reheats, less labor and lower costs!



NAZEL
MOTOR DRIVEN AIR ACTUATED
FORGING HAMMER

Exclusive DILL SLOTTER features are:

Quick Traverse Gear — *A great time and labor saver.*
New Quick Return — *Permits high and uniform cutting speeds.*
New Intermittent Feed — *For feeding heavy work at high speeds.*
Automatic Knock-off — *A safety device for the feed mechanism.*
Stroke Indicator — *Quite indispensable; nothing like it.*
Hand Wheel Controller — *A good thing and in the right place.*
Tool in the Relief Apron — *Very handy in changing tools.*
Six Changes of Speeds — *About four is the usual number.*
Powerfully Geared — *About double the usual ratio.*
Belt or Motor Driven — *Designed for both; not a makeshift.*

Investigate — write for details

DILL • SLOTTER •

Now Made and Sold by—NAZEL HAMMER DIVISION

LOBDELL
CAR WHEEL COMPANY
103 Years in Business
WILMINGTON·DELAWARE

POWER DRIVEN FORGE HAMMERS

As necessary as anvils and forge . . . they do away with heavy hand forging . . . can be used on lightest as well as heaviest work. Made in 5 sizes—25 lb. to 500 lb. ram. Shown here is 100 lb. ram.

All Murray Improved Hammers are extremely powerful, yet simple in design, and can be operated under perfect control with little effort. Before being improved by us, these hammers were known as Mayer-Moloch. If you have a Moloch Hammer, ask us about our repair and parts service—or write for details of any size Murray Hammer you require.

D. J. MURRAY MFG. CO.
WAUSAU, WISCONSIN

Established 1883 ***Offices in principal cities***

MINSTER PRESSES *Do a better job*

The Minster Machine Company is a self-contained unit with undivided responsibility—everything is closely controlled to make MINSTER PRESSES a product with machine tool precision.

Dies requiring unbalanced pressure distribution produce better stampings in MINSTER PRESSES—long gib bearing surfaces maintain alignment of the slide with respect to the bed. Recessed openings in the slide provide ease in fastening the top dies.

Write now for illustrated bulletins.

THE MINSTER MACHINE CO.
MINSTER, OHIO

YOUR TOOL ROOM

IS YOUR FIRST LINE DEFENSE AGAINST HIGH PRODUCTION COSTS You Will Be Wise to Give It Consideration NOW!

Modern production machines are designed to use modern cutting Tools—carefully ground to proper angles and clearances and close tolerances.

* * *

Why buy modern machine tools unless you keep them modern by providing properly sharpened cutting tools.

* * *

Oliver of Adrian drill grinders, tool and cutter grinders, face mill grinders, tap grinders, etc., are the most modern, up-to-date and reasonably priced grinding machines available anywhere. They are designed and built to give you easy operation—fast and efficient service—reground tools that will outperform—tools that will last longer between grinds, eliminate breakage, reduce scrapped parts and cut machine down-time.

* * *

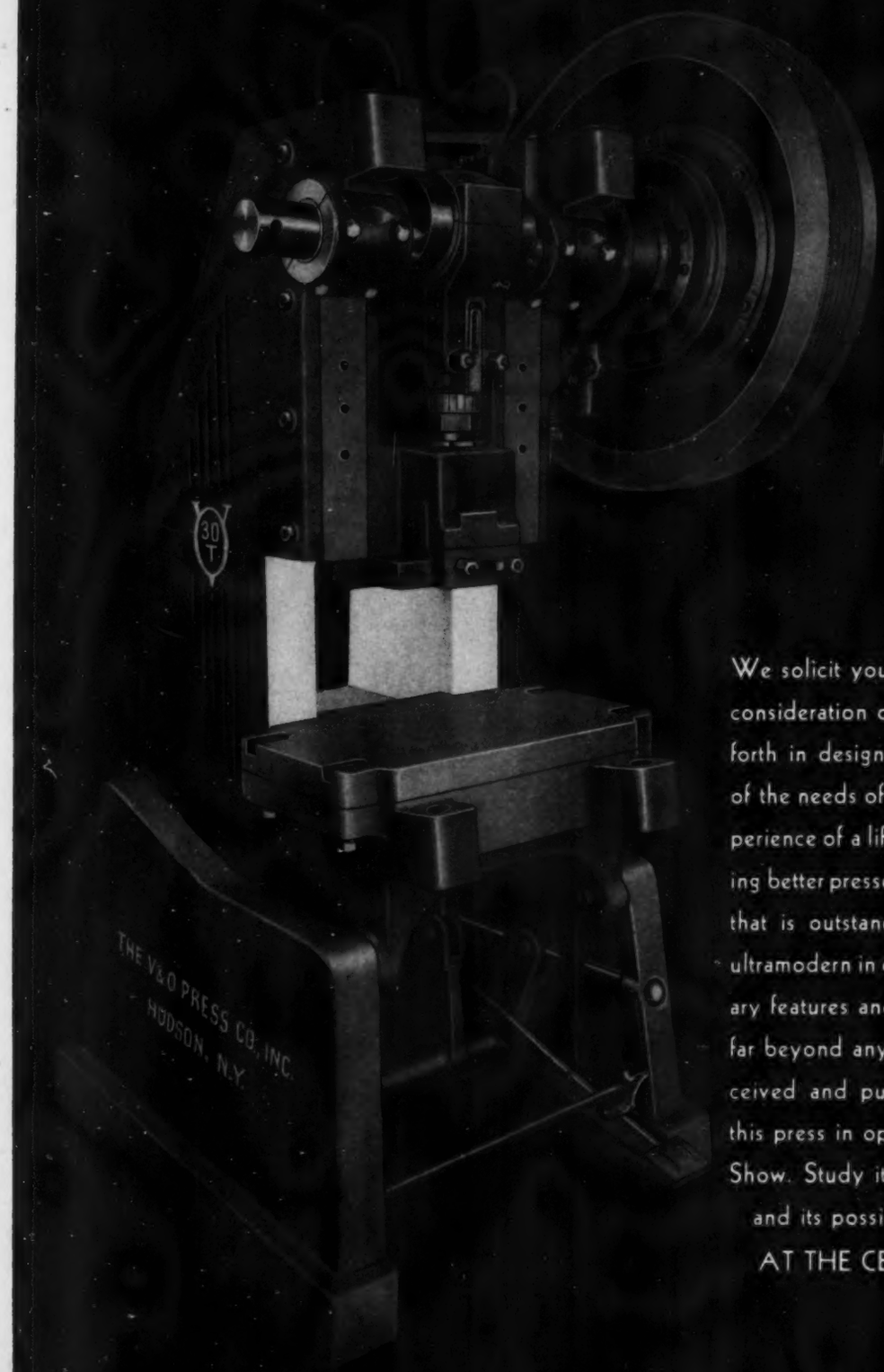
Send for illustrated booklets that will show you the way to more profits thru modern tool reconditioning methods

Cut illustrates the new 510 Oliver automatic twist drill pointer—for drills 1/4 to 3"—Variable point angles—variable clearances.

OLIVER INSTRUMENT CO.

ADRIAN 1414 E. Manuel St. MICHIGAN, U.S.A.

1889 ★ *On our* GOLDEN ANNIVERSARY *year* ★ 1939



☆

We solicit your thoughtful attention in consideration of the effort we have put forth in designing a press to take care of the needs of tomorrow. With the experience of a lifetime behind us in building better presses, we offer you a machine that is outstanding in appearance and ultramodern in design. It has revolutionary features and points of merit that are far beyond anything that has been conceived and put into use thus far. See this press in operation at the Cleveland Show. Study its features, its versatility and its possibilities. Booth F-45—

AT THE CENTRAL ARMORY

☆

THE V&O PRESS COMPANY, INC., HUDSON, N. Y.

THE *New* HYDROHONER

MICROFINISH-*ES* parts ¼" to 2" in diameter

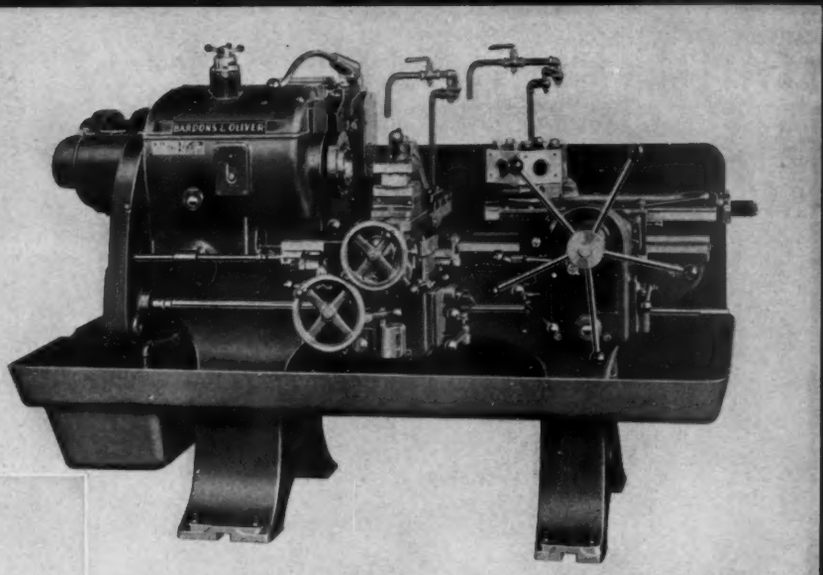
REG. U. S. PATENT OFFICE

- ★ Horizontal, bridge type machine
- ★ Hydraulic expansion of abrasive
- ★ Variable pressure adjustment
- ★ Multi-directional abrading motion
- ★ Synchronized operating controls
- ★ Hydraulic table movement
- ★ Adjustable stroke control
- ★ Rapid stock removal
- ★ Accuracy to extremely close tolerances
- ★ Any desired degree of accurate surface finish

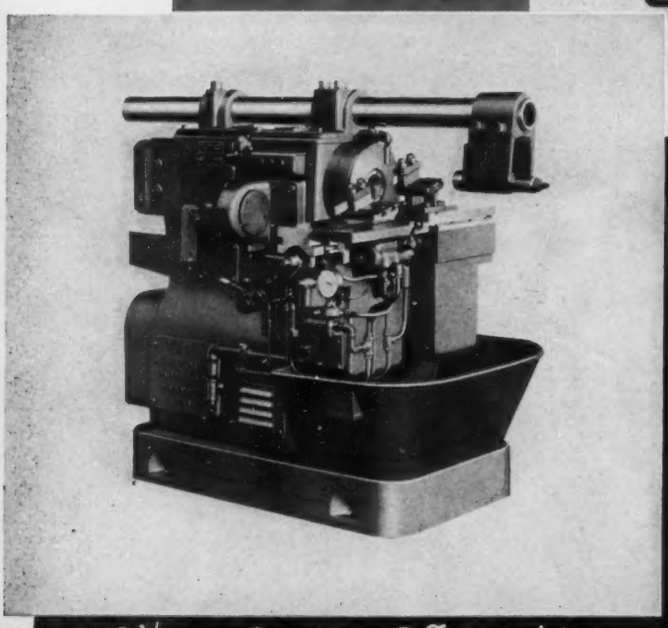
MICROMATIC HONE CORPORATION

7401 Dubois Street — Detroit, Michigan

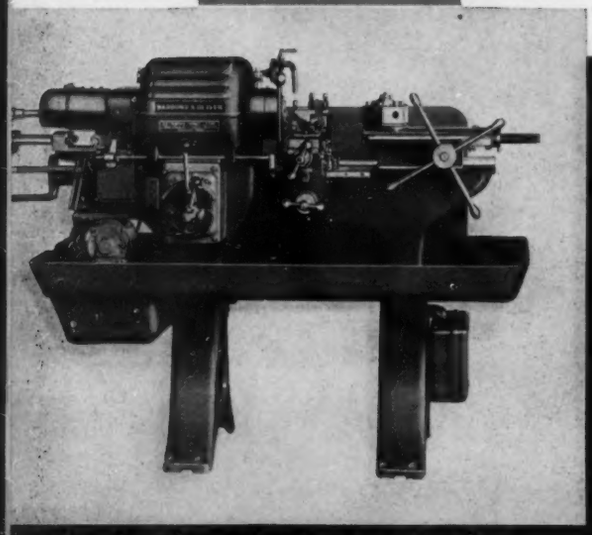
BARDONS &



No. 5 Universal Turret Lathe



3½ in. Cutting-Off Machine



No. 1 Electric Turret Lathe

WILL EXHIBIT AT THE

FIVE TURRET LATHES AND ONE CUTTING OFF MACHINE featuring many outstanding developments. We extend a cordial invitation to visit our booth and study the production increasing, cost reducing possibilities of these latest improvements.

Here are a few of the many interesting and valuable features to be displayed:

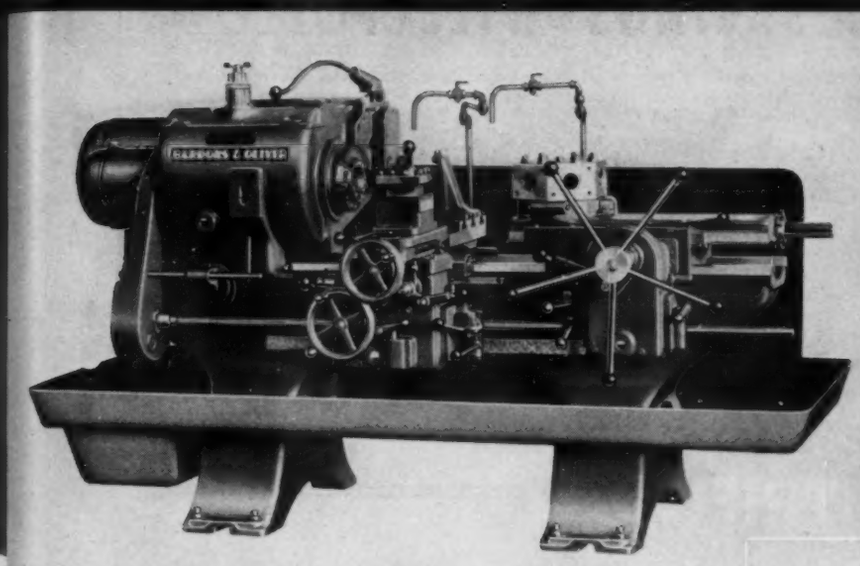
THE SINGLE LEVER SPINDLE SPEED PRESELECTOR on the No. 5 and No. 7 Universal Turret Lathes possesses great potentialities for reducing production costs. Because of the quickness and ease with which the spindle speed changes can be made, the most efficient cutting speed will always be maintained. The extreme simplicity of the hydraulically operated gear shifting mechanism will prove interesting to executives, engineers and production men alike.

NEW DIRECT READING SPEED AND FEED DIALS WITH SINGLE LEVER SELECTORS on a No. 3 Turret Lathe. Details of these controls and their production increasing possibilities will be disclosed for the first time at the show.

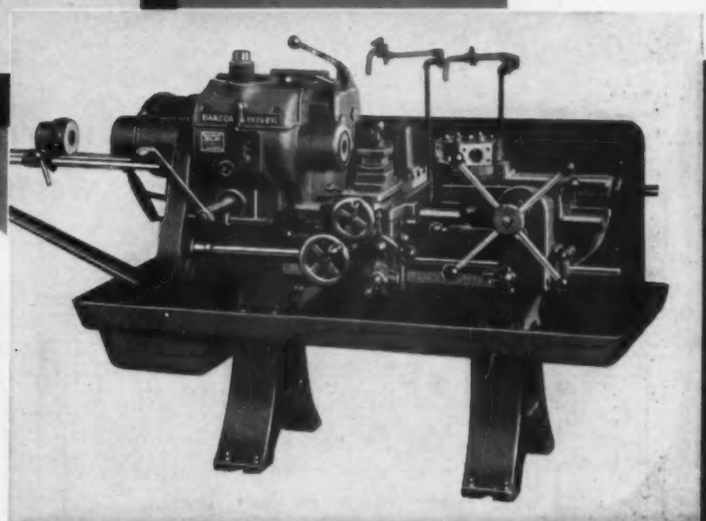
THE DIRECT READING SINGLE LEVER SPEED AND FEED CONTROLS on the No. 2 Geared Electric Turret Lathe enables the operator to make all changes

BARDONS & OLIVER, INC.

& OLIVER



No. 7 Universal Turret Lathe



No. 3 Universal Turret Lathe

MACHINE TOOL SHOW

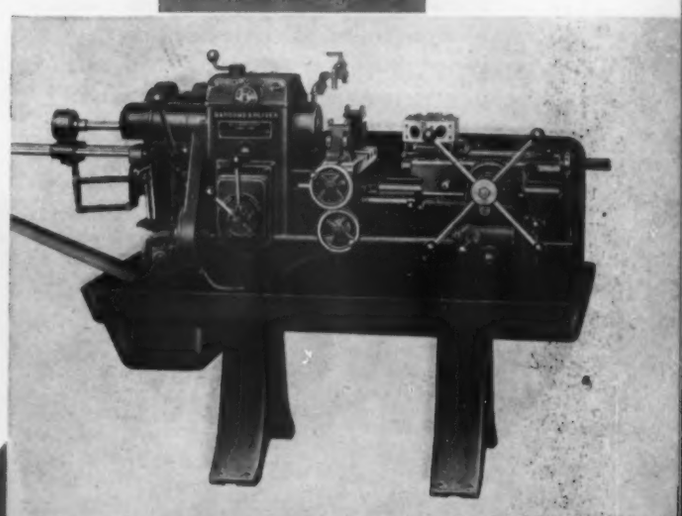
quickly and accurately, and thus keep the machine running at highest efficiency.

THE NEW AUTOMATIC HALF CYCLE AND FULL CYCLE CONTROL of the POWER AUTOMATIC CHUCK AND BAR FEED ON THE No. 1 ELECTRIC TURRET LATHE AND No. 2 GEARED ELECTRIC TURRET LATHE now makes the advantages of power chucking available for castings, forgings and second operation work.

THE FIVE SIZES OF TURRET LATHES EXHIBITED, cover, by logical steps, bar capacities from 5/8" to 2½" and chucking work of up to 15" diameter. Each is designed and engineered to handle, with highest efficiency, work coming within its particular range, and is thus outstanding in its own field.

THE 3½" AUTOMATIC CUTTING OFF MACHINE features hydraulically operated double tool slides for maximum production. Particular attention is invited to the ease of setup and simplicity of operation. This machine is only one of a complete line of sizes which we build, covering a range from 1" to 26" capacity.

The above features are merely a few of the many recent and interesting developments that will be exhibited by us in Booth 5103 at the Cleveland Show.



No. 2 Geared Electric Turret Lathe

1133 W. 9TH, ST. CLEVELAND OHIO

SELECT THE RIGHT WHEEL
AND SAVINGS WILL FOLLOW

Vitrified makes it possible to standardize on grinding wheels by offering a wide range of standard types which cover practically all wheels used on standard makes of grinding machines.

Selection of the right wheel for the work to be handled is simplified in the Vitrified catalog—a 65-page booklet which gives specific data, dimensions, etc., covering the entire Vitrified line.

Send for this catalog. Choose a grinding operation in your shop on which you would like to cut costs. Select the Vitrified wheel which meets your specifications, try it out, and compare results with the method formerly used—and you, too, will join the long list of progressive manufacturers which have standardized on Vitrified.

Write for the catalog today

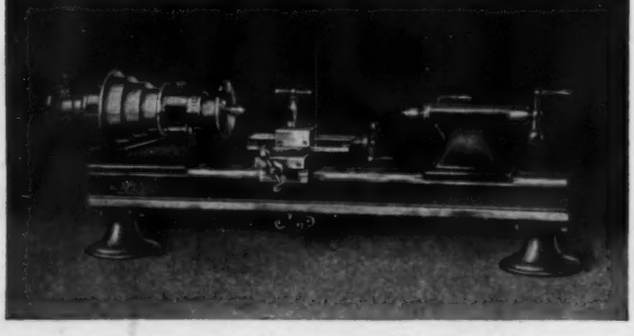
VITRIFIED

VITRIFIED WHEEL COMPANY
WESTFIELD **MASS.**

AMES
BENCH LATHE No. 3

THIS popular all-purpose Lathe made with either plain or ball bearing headstock of 5/8 inch or 1 inch collet capacity . . . *It is the highest type Precision Lathe built* . . . Attachments for turning, milling, drilling, grinding and threading. Bed 36 inches long, machined all over. Swing 8 3/8 inch diameter. Compound Slide Rest swivels 50° both sides of center. Available with motor drive.

B. C. AMES CO. Waltham, Mass.



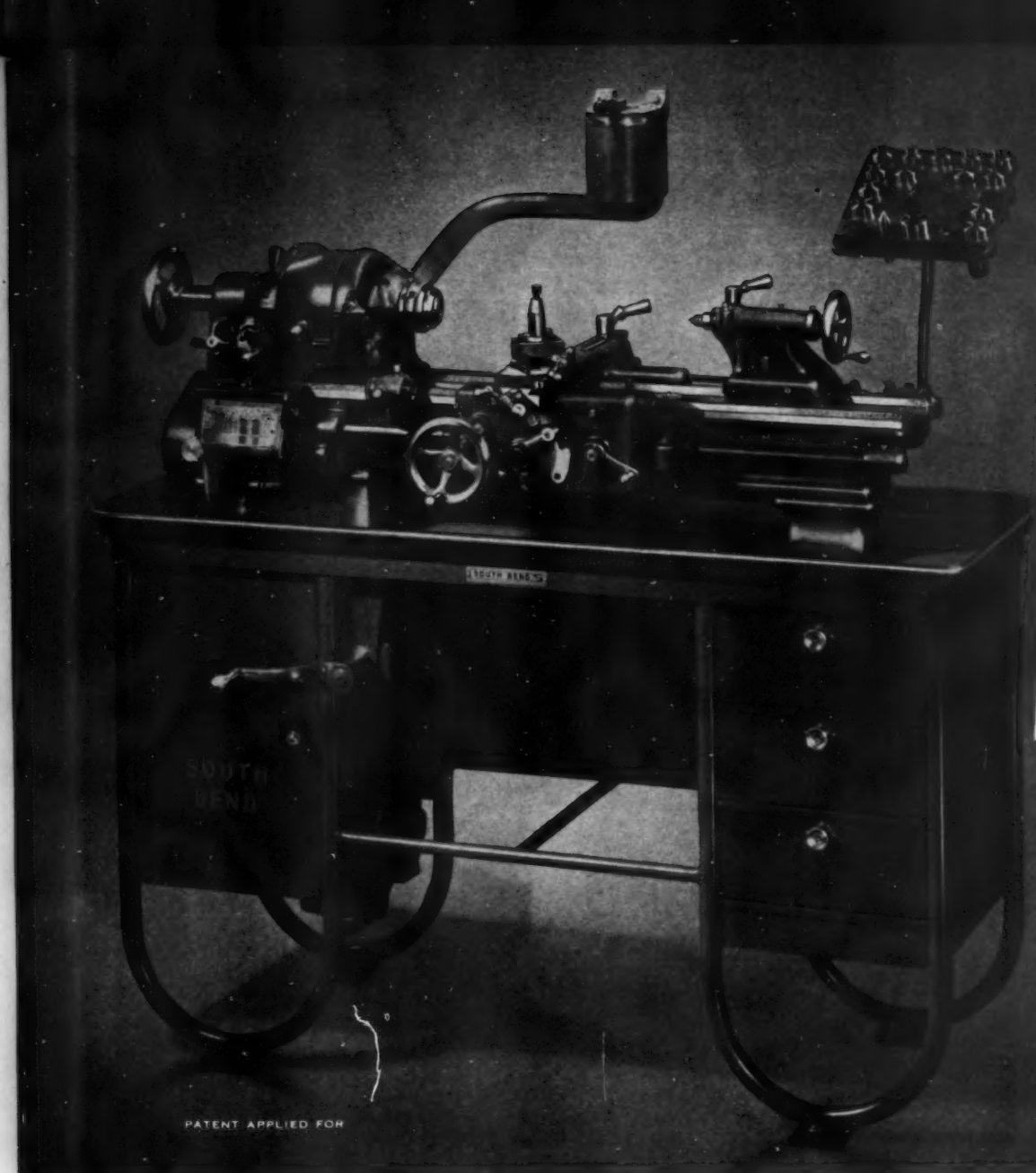
KNOCK-OUT
Reamer and Cutter Grinder

Slip-Proof Keyless Chucks

Knock-Out ball bearing chucks are accurate, heavy duty, slip proof, and permit using the ultimate strength of drills. Only a slight finger tip twist is required to hold drills, as the gripping action is self-energizing. Releasing drills is almost as effortless. Changing drills becomes a matter of seconds.

With the Knock-Out Universal Tool Grinder you can grind cutters, reamers, taps, end mills, metal slitting saws, carboloy bits, etc. quickly and accurately. Send for bulletin AC39A.

K. O. LEE & SON CO.
Aberdeen, So. Dak.
"practical tools for practical men"
KNOCK-OUT



NEW SOUTH BEND 1" COLLET LATHE

●

9" SWING OVER BED
1⅜" SPINDLE HOLE
12 SPINDLE SPEEDS
POWER CROSS FEED
POWER LONG. FEED
SCREW THREADS 4 TO 224 PER INCH

1" Collet Capacity 9-inch Swing South Bend Underneath Belt Motor Drive Quick Change Gear Tool Room Precision Lathe. Mounted on all steel welded bench. ¾ H. P. instant reversing ball bearing motor and 12-speed drive are enclosed in left side of bench.

THIS new 1" collet capacity 9-inch swing back-geared, screw-cutting lathe has the time saving features of an engine lathe combined with the sensitivity and accuracy of a fine precision collet lathe. It is capable of the most exacting tool and instrument work, and has the power and rigidity for taking heavy cuts on high speed production operations.

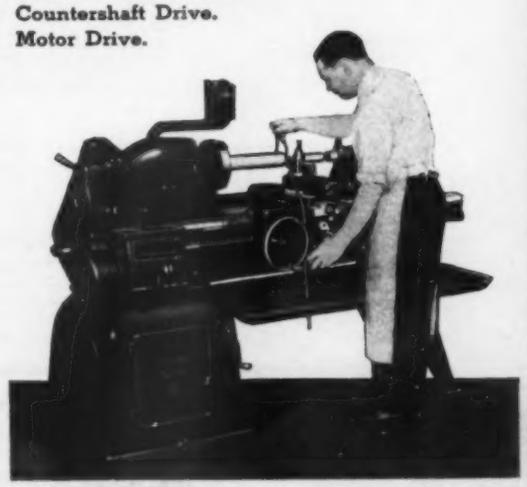
Tool Room Attachments as illustrated include hand wheel draw-in collet chuck attachment, telescopic taper attachment, micrometer carriage stop, thread dial indicator, and collet rack.

Manufacturing Attachments available include hand lever draw-in collet chuck attachment, semi-automatic hand lever bed turret, double tool rest, automatic carriage stop, four-way tool post turret, oil pump, piping.

Immediate Delivery can be made on all popular sizes of South Bend Lathes from dealer display stocks in principal cities; a few are listed below.

68 Sizes and Types of Lathes

9", 11", 13", 14½", and 16" Swing.
3' to 12' Bed Lengths.
Countershaft Drive.
Motor Drive.



16" x 6' Underneath Belt Motor Drive Lathe

Send For Illustrated Catalog

ON DISPLAY IN PRINCIPAL CITIES

Boston, Mass. — The MacKenzie Machinery Company
Buffalo, N. Y. — J. L. Osgood Machinery & Tool Co.
Chicago, Illinois — C. B. Burns Machinery Company
Cleveland, Ohio — Reynolds Machinery Company
Detroit, Michigan — Lee Machinery Company, Inc.
Los Angeles, Calif. — Eccles & Davies Machinery Co.
Milwaukee, Wis. — W. A. Voell Machinery Company
Newark, N. J. — I. R. Edwards Machinery Company
New York, N. Y. — A. C. Colby Machinery Company
Philadelphia, Pa. — W. B. Rapp, Machinery
Providence, R. I. — Geo. T. Reynolds & Son, Inc.
San Francisco, Calif. — Moore Machinery Company
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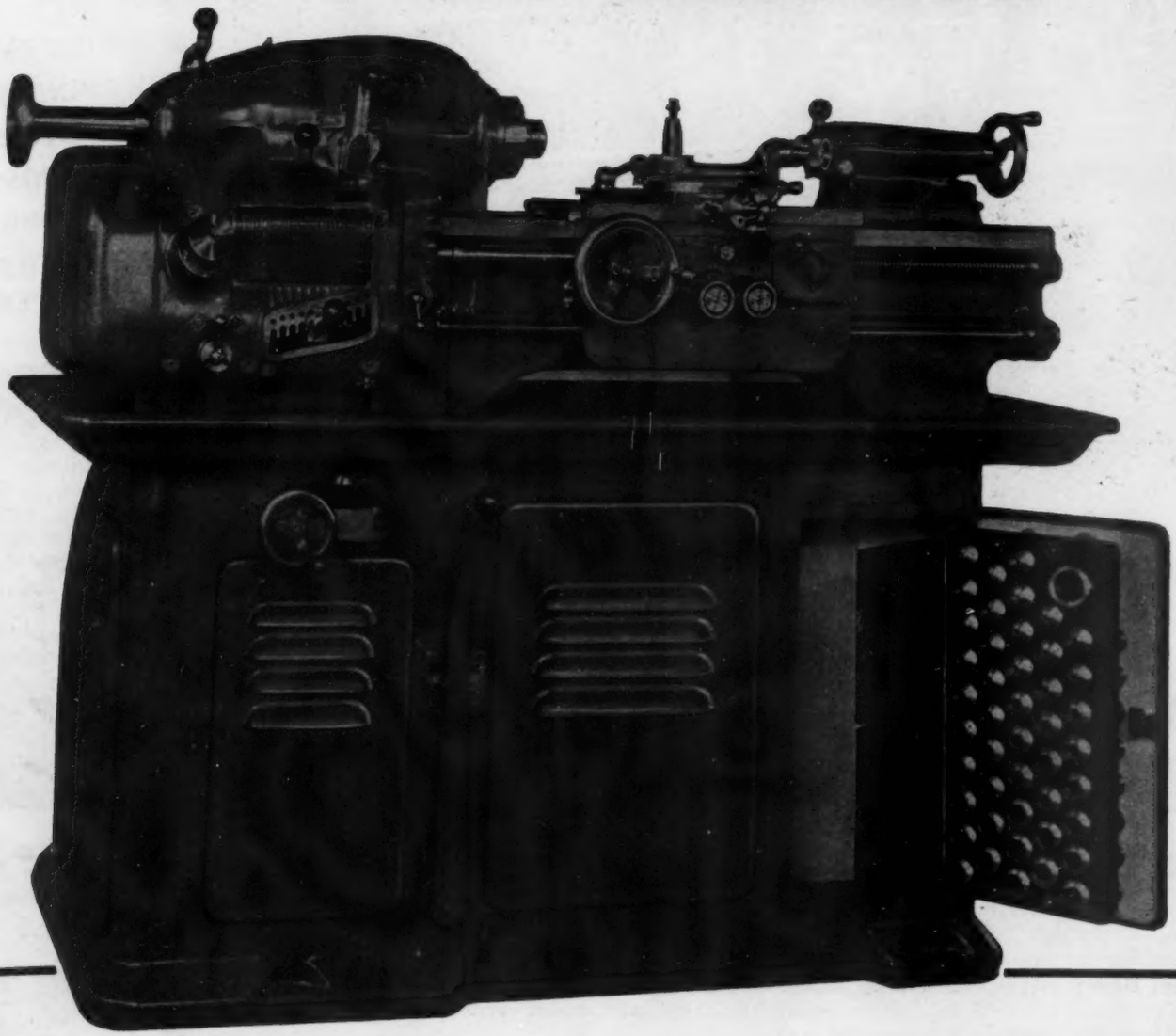
TRADE MARK SOUTH BEND TWIN ENGINE LATHES

SOUTH BEND LATHE WORKS

Lathe Builders Since 1906

276 E. Madison St., South Bend, Indiana, U. S. A.

THE NEW
HENDEY
TOOL AND GAGE MAKERS' LATHE



A high speed sensitive precision lathe made to meet the demand for a lathe heavier and of greater adaptability than the standard bench lathe.

Swing over ways 10¼". Range of spindle speeds 40 to 2000 RPM. with ANY AND ALL SPEEDS OBTAINABLE IN THIS RANGE. 66 changes of threads from 2 to 120 per inch without duplicates. Metric threads can be cut from Om/m.1 to 15 m/m.

Spindle is hardened and ground and mounted in super precision anti-friction bearings front and rear, with front bearings pre-loaded to best engineering practice. Spring collet capacity up to 1⅛" round stock. Starting and stopping of spindle controlled thru multiple disc clutch and foot brake.

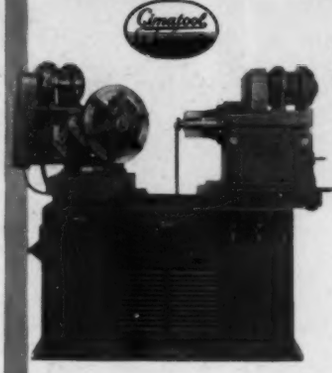
Height of centers above floor 45¾". Complete information in bulletin just published.

THE HENDEY MACHINE COMPANY
TORRINGTON, CONN., U. S. A.

Boston ***New York*** ***Rochester*** ***Detroit*** ***Chicago***

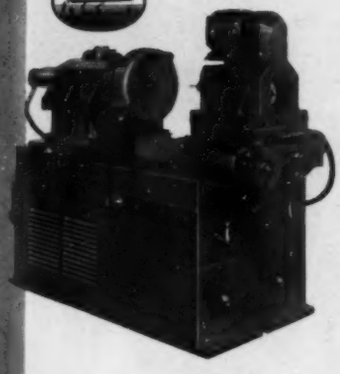
CIMATOOL NO. 200 GEAR BURRING MACHINE

Burrs at the rate of 1250 teeth per minute to eliminate the hazard of crystallization and chipping in service. Action similar to that of a hobbing machine with two cutters operating simultaneously, one for the front of the tooth and one for the rear.



CIMATOOL No. 106-A UNIVERSAL HOLLOW-MILL GEAR CHAMFERING MACHINE

This machine has just one work head and one cutter spindle for hollowmill chamfering only. It incorporates the principle of finger indexing with a rigid wedge for positioning the work gear while cutting is in progress.



CIMATOOL No. 201-A CONTOUR BURRING MACHINE

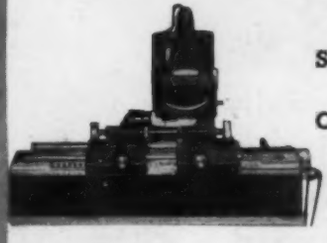
Operates on a completely automatic cycle to burr the ends of gear teeth over their entire profile—top, sides and root. Extremely important for high speed gears such as those used in aircraft engines.

SHEFFIELD VISUAL GAGE

In magnifications of 500, 1000, 2000, 5000 and 10,000 to one—smallest graduations on dial from one "tenth" to ten "millionths". All units utilize the frictionless and mechanically positive Reed Mechanism for magnification. No elements to wear out of adjustment.

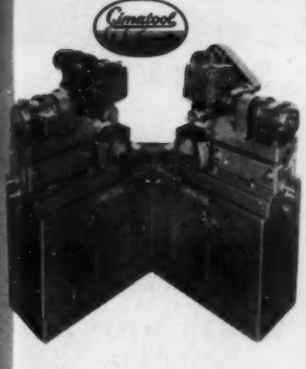
CIMATOOL No. 105-B GEAR CHAMFERING MACHINE

Gives gear tooth ends a prescribed form (circular, angular or a combination) to facilitate sliding mesh. Applicable to spur, helical, hypoid or spline gears, internal or external, up to 25" in diameter. Processes any specified number or grouping of teeth.



SHEFFIELD PRECISION THREAD LEAD CHECKING MACHINE

Determines errors in lead, using standard precision blocks for reference. Magnification of thread error is accomplished by the Sheffield frictionless Reed Mechanism and read directly on the illuminated dial.



CIMATOOL No. 103½-C GEAR CHAMFERING MACHINE

Has two heads and two cutter spindles which provide for the chamfering of two work gears simultaneously. Like the No. 105, either hollow mill or pencil cutters may be used.

SHEFFIELD ELECTRIC GAGE

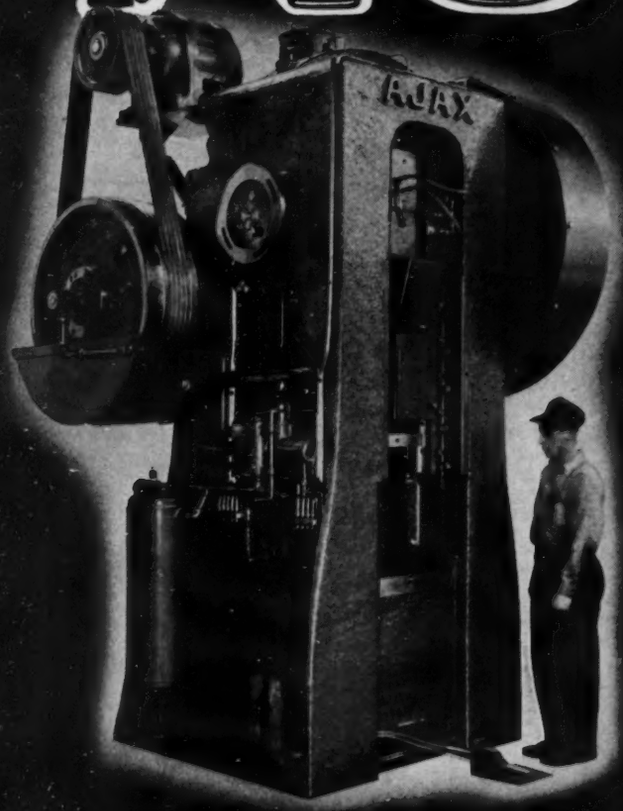
Rapid precision comparator—flashes red when work part is undersize, green when over-size and yellow when within tolerances. Also for machine control, for automatic or multiple gagging and to actuate selectors.

Latest Developments in Gear Processing and Precision Measuring Equipment

THE CIMATOOL COMPANY ★ SHEFFIELD GAGE CORPORATION *Dayton, Ohio* U. S. A.

AJAX

See These 4 IN ACTION...



. . . at the

thoroughly modern, specially equipped plant where this complete line of AJAX high production machines is constructed. Investigate their wonderful profit possibilities.

Send for Bulletins

No. 75 Solid Frame Forging Presses

No. 65A Upsetting Forging Machines

No. 110 Hogue Wire Drawer

No. 130 Bar Drawer and Straightener

THE AJAX MANUFACTURING COMPANY

621 Marquette Bldg. Chicago, Ill.

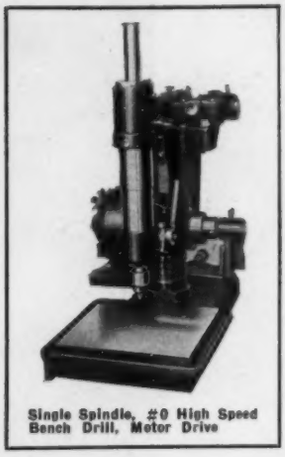
EUCLID BRANCH P. O. CLEVELAND, OHIO

201 Dewart Bldg. New London, Conn.

SIGOURNEY

Meet modern demands for absolute precision

DRILLING MACHINES



Single Spindle, #0 High Speed Bench Drill, Motor Drive

To have your plant equipped with these strong, speedy Sensitive Drilling Machines will enable you to meet modern production demands.

Sigourney Means Sensitivity

Sigourney Drilling Machines—in one, two, three and four spindle types,—furnished either belt or motor driven, bench or pedestal models,—are highly sensitive true running machines, fitted throughout with quality ball bearings. Spindles have a vertical movement by means of hand levers, and are fitted with No. 1 Morse Drill Taper. They have three speeds and are provided with clamp stops which are instantly adjustable to determine the depth of hole to be drilled. Ball bearings receive the thrust. Parts are interchangeable. They are highly sensitive and run absolutely true.

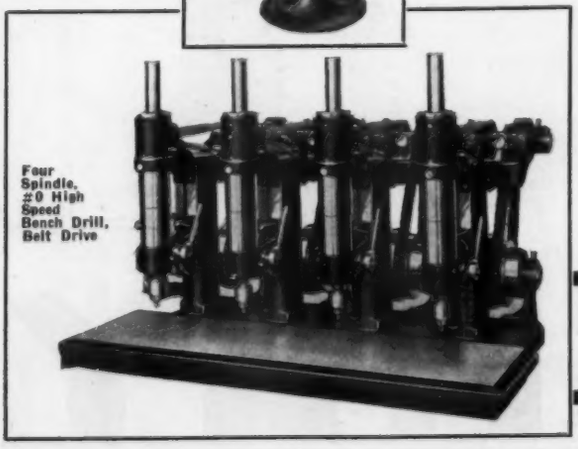
Single Spindle, Ball Bearing, Floor Type Belt Drive

Three Spindle, Ball Bearing, Floor Type, Belt Drive

Write for full details of

Sigourney Precision Drilling Machines

We are prepared to furnish mechanical details . . . or to work with you actively (without creating any obligation on your part) toward more effective modernization of your production, wherever Sigourney Tools can be fitted into your layout. It will cost you nothing to have us recommend . . . . we know this field and may be able to help you effect genuine economies.



Four Spindle, #0 High Speed Bench Drill, Belt Drive

Write today. Tell us whether you want just literature, or a representative to call . . . . we will not send a man unless you so instruct us.

THE SIGOURNEY TOOL CO.

Hartford, Connecticut, U. S. A.

Don't buy until you have seen the

NEW . . . "Stark" Integral Drive

Precision Bench Lathe

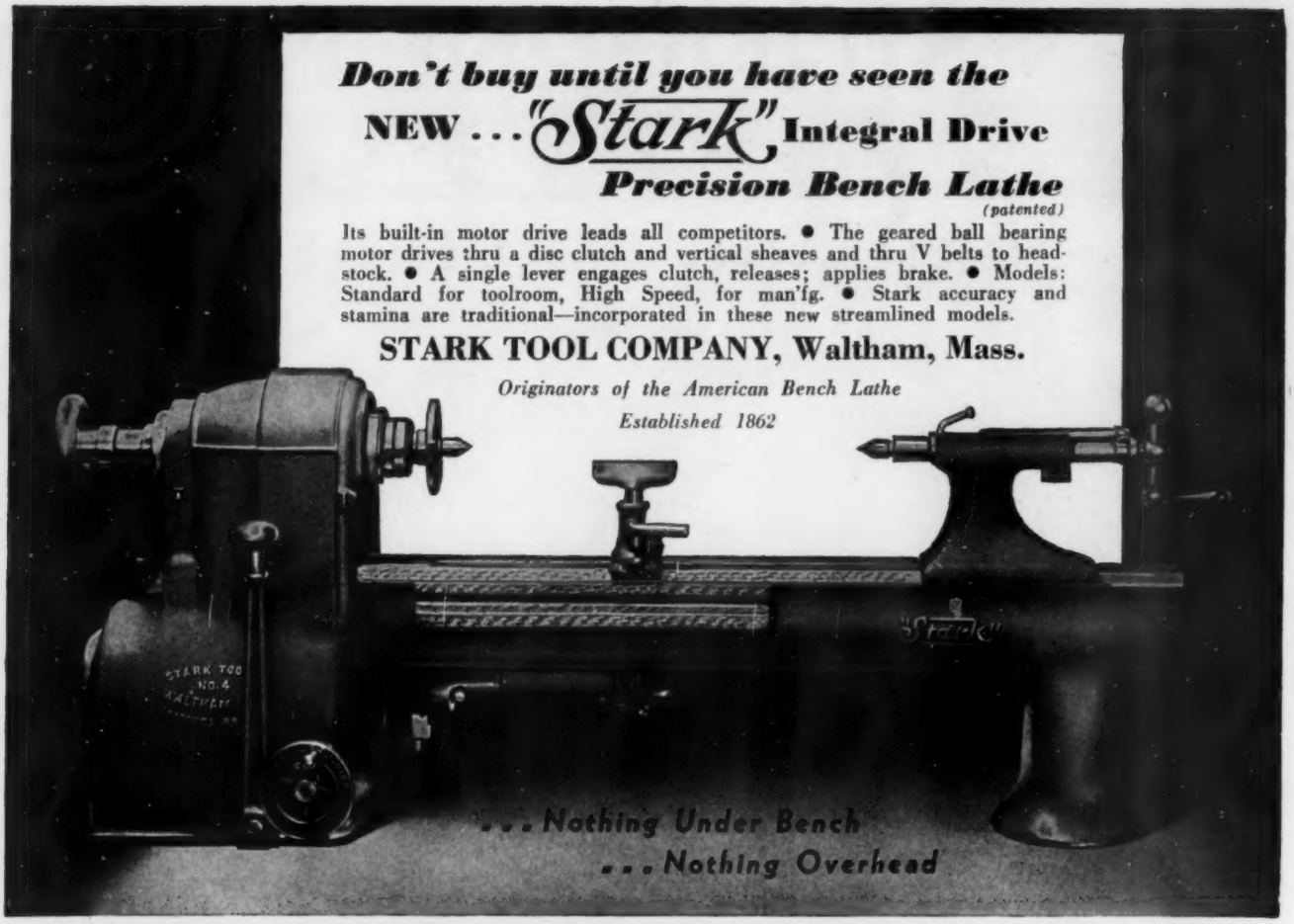
(patented)

Its built-in motor drive leads all competitors. • The geared ball bearing motor drives thru a disc clutch and vertical sheaves and thru V belts to headstock. • A single lever engages clutch, releases; applies brake. • Models: Standard for toolroom, High Speed, for man'fg. • Stark accuracy and stamina are traditional—incorporated in these new streamlined models.

STARK TOOL COMPANY, Waltham, Mass.

Originators of the American Bench Lathe

Established 1862



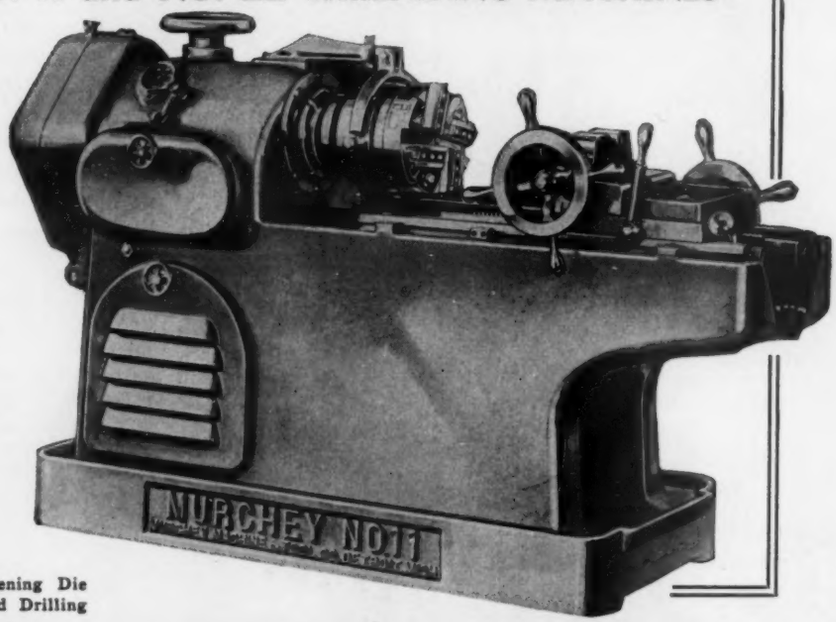
NOTE THE ADVANCED FEATURES OF MURCHEY NO. 11 and NO. 22 THREADING MACHINES

. . maximum productivity with highest accuracy

Note the accuracy and uniformity of the work—the simple, easy operation through centralized controls—the neat appearance with motor concealed in base and push button controlled.

These machines — with Tangential Chasers as standard equipment insure maximum productivity between grinds. For pipe threading, receding die heads are used.

Available in single and double head types. Capacities: No. 11, from ¼" to 1½" machine threads and ⅛" to 1¼" pipe threads; No. 22, from ¼" to 2½" machine threads and ⅛" to 2" pipe threads.

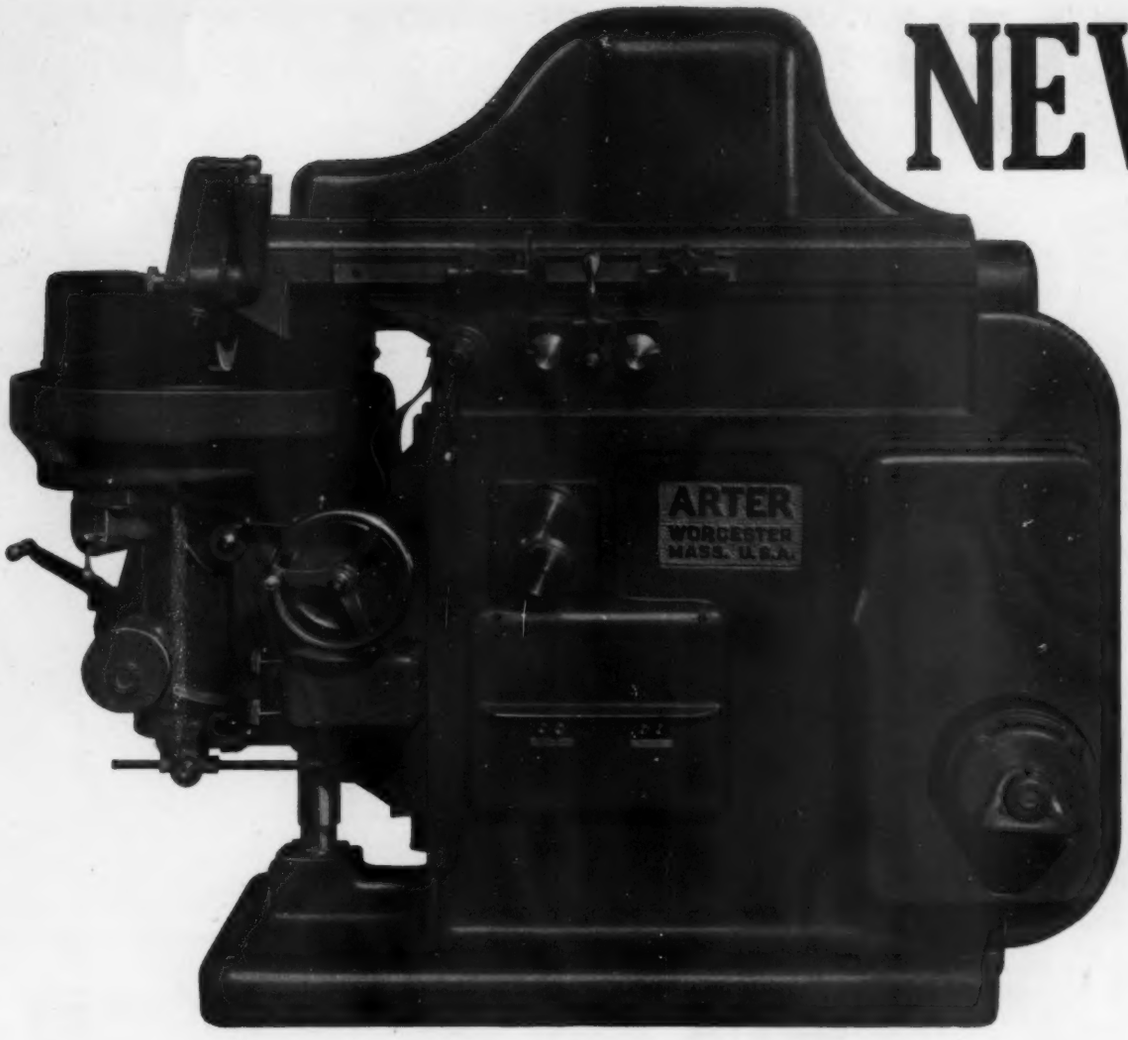


THE MURCHEY MACHINE & TOOL CO.,
DETROIT
MICHIGAN

Murchey makes Collapsible Taps, Self Opening Die Heads, Double end Reaming, Chamfering and Drilling Machines; Pipe Cutting Off Machines.

MURCHEY

NEW



ARTER Model D–16" Rotary Surface Grinder

Greater production, precision and better finishes, are obtainable in the New Arter Model "D" Rotary Surface Grinder.

Wheel slide hydraulically operated, with piston rod and wheel spindle axis level with the longer, front extended, widened ways, gives smoothness to the traverse and stability to the spindle mounting. Ways automatically lubricated from pump.

Wheel spindle driven from motor mounted on head. Maximum power delivered to wheel by short V belt drive. Belts easily tensioned and pulley on spindle end simplifies belt replacements. Adjustable front bearing, circulating lubrication.

Knee has longer and wider bearing ways, automatically pump lubricated. Tiltable spindle housing.

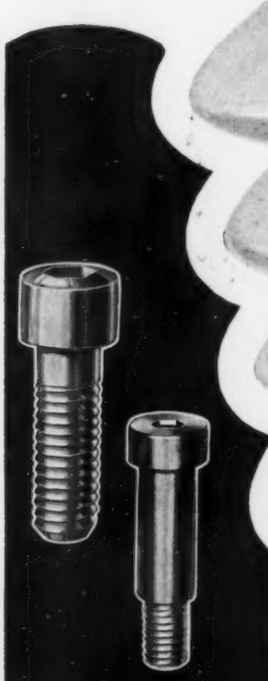
Chuck spindle mounted top and bottom in double-row, precision, preloaded ball bearings. Driven by V belts from electric motor vari-speed drive unit.

In addition to these important improvements, the grinder controls are conveniently mounted, electric controls are in a single panel, flush mounted; motors, belts and piping are adequately guarded. Smooth machine lines make cleaning easy.

ARTER GRINDING MACHINE CO.

Worcester, Massachusetts

ALLEN
COLD-DRAWN



Strength-tested by every known device

— and more to come!

There is more to a line of Hollow Screws than what you may be getting in the screws at the time you happen to buy.

There's worthier quality or finer features ahead, if the line be that of a manufacturer whose production-processes are coordinated with a policy of continuous development.

Improvement is as integral a part of Allen manufacturing as is the turning of factory wheels: — perfecting of product goes on so steadily it's seldom brought to your attention, except in the excellence of performance.

By your confidence that Allen is *doing* these things, you are certain of getting every advantage that accrues from the use of these screws in your plant or product.

THE ALLEN MFG. COMPANY
HARTFORD, CONN. U. S. A.

ERRINGTON
STAPLETON, STATEN ISLAND, N. Y.
MULTIPLE HEADS

Super-Sensitive Fixed-Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Tapping Heads

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

SAVE MONEY

With This MIDGET PUMP

Low purchase price. Low operating cost.

Replaces larger, more expensive pumps on many jobs. Motor: 1/5 h.p. Discharge Pipe: 3/8". Write for full particulars.

NARRAGANSETT PRODUCTS CORP.
45 Baker Street Providence, R. I.

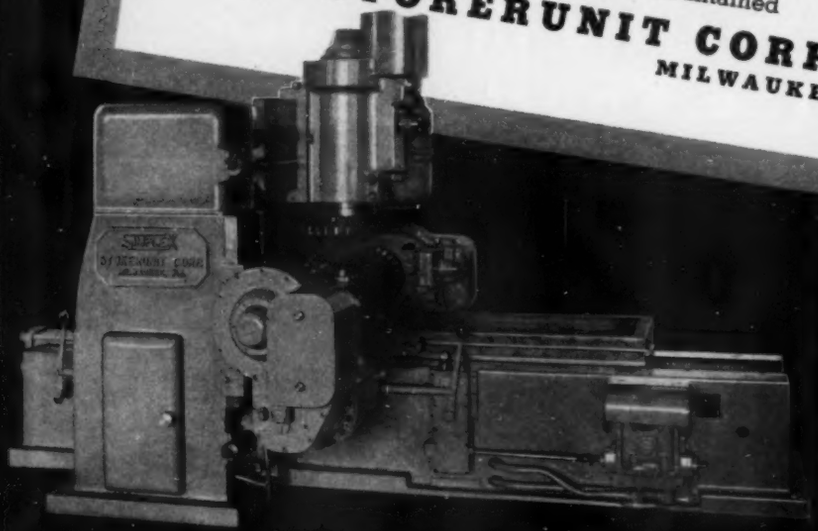
★ SIMPLEX ★

PRECISION BORING MACHINES and PLANER TYPE MILLING MACHINES

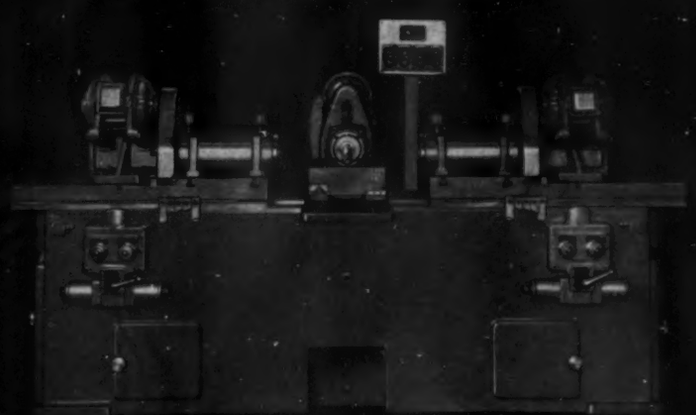
ALMOST any combination of Boring, Turning, and Facing on the small or medium production jobs can be handled at minimum cost on SIMPLEX PRECISION BORING MACHINES. All models are characterized by simple design, low cost, convenient operating features, flexibility, and maintained accuracy. Let us make recommendations and send production estimates on your precision boring jobs.

SIMPLEX PLANER TYPE MILLING MACHINES are individually designed for the most efficient handling of heavy milling work.

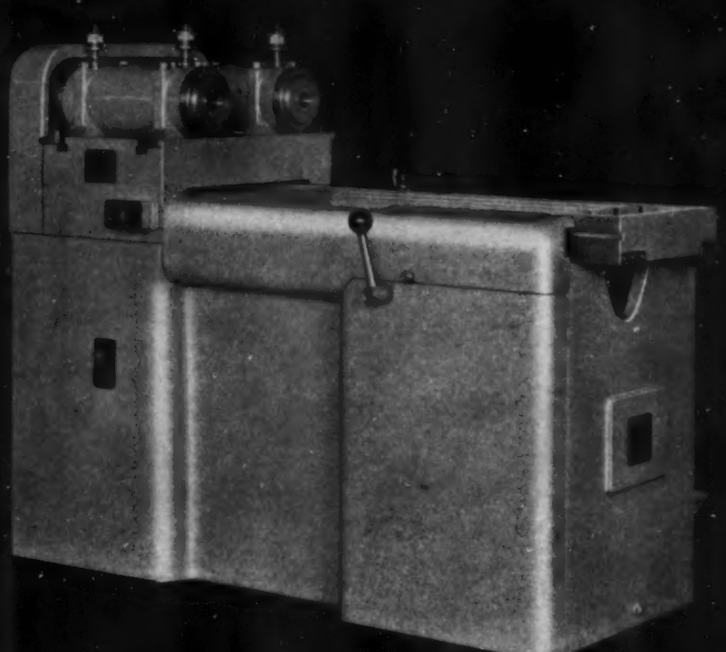
THE STOKERUNIT CORPORATION, 4548 W. Mitchell St.
MILWAUKEE, WIS.



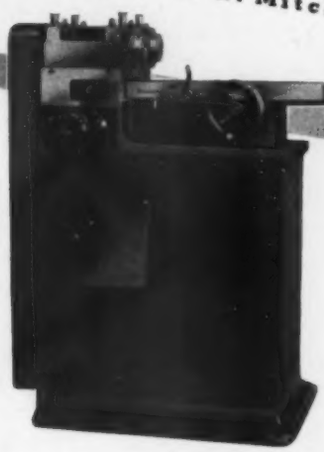
Planer Type Milling Machine with Three Individually Driven Motor Heads.



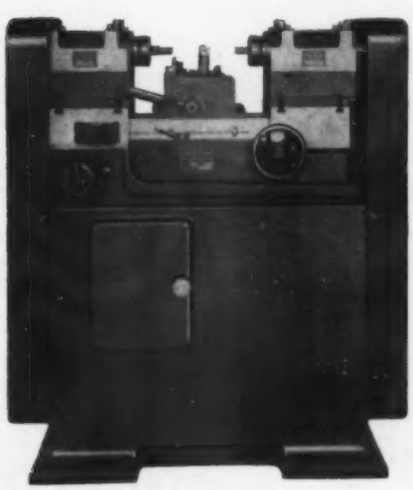
Three-way Unit Type Precision Boring Machine.



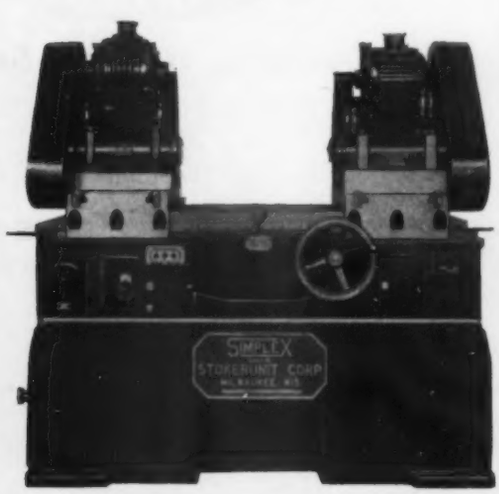
No. 3 Simplex Precision Boring Machine Two Spindles and Large Table.



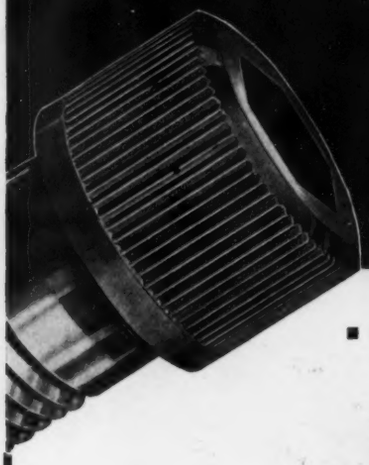
No. 1 Simplex Precision Boring Machine — Two Spindles



No. 1 Double End Machine with work fixture in the middle.



No. 200 Series Double End Machine—Four Spindles



Screw Adjustments made FASTER and EASIER when you use the screws with the Knurled grip.

.....KNURLED.....

UNBRAKO

Fig. 1434 Knurled "Unbrako" Socket Head Cap Screw Pat. Pend.

SOCKET HEAD CAP SCREWS

NOTE THE GRIP

The knurling around the heads of the "Unbrako" provides the mechanic a real non-slip grip for greasy fingers or a better purchase for his pair of pliers than is possible with the smooth head or ordinary hex head cap screw. Where machines require numerous adjustments during the course of a normal working day, considerable of the operator's time can be saved and the machine given many added minutes of actual productive service. Minutes thus saved generally mean many extra dollars to you over the year's period.

Write now for samples, and see for yourself the superior grip on the Knurled "Unbrako" . . . we'll gladly explain the many other exclusive advantages also.

Protect against Accidents and Machinery Breakdowns apply

UNBRAKO

Self-Locking Hollow Set Screws

. . . wherever ordinary set screws may be vibrated or shaken loose, equip with the "Unbrako" Self-Lockers. The knurling around the points that automatically locks them in place, once they've been tightened into place, provides real protection against the unpredictable damage that can result when ordinary set screws loosen up and unwind. Installation and removal for adjustments are easily and quickly made with the customary hex bar-wrench. The screws may be reused indefinitely. Write for full particulars and samples.

Figs. 1645-41 Pats. Pend.

STANDARD PRESSED STEEL CO.

BRANCHES
BOSTON
DETROIT
INDIANAPOLIS

JENKINTOWN, PENNA.
BOX 4

BRANCHES
CHICAGO
ST. LOUIS
SAN FRANCISCO

ALL TYPES OF GRINDING MACHINES

HIGH QUALITY

+ MACKLIN GRINDING WHEELS

WILL "PROTECT YOUR PRODUCTION"

Macklin Grinding Wheels are manufactured in all sizes and shapes in all kinds of grain and grade combinations. No matter what type of grinding job . . . . there is a Macklin Wheel that will "Protect Your Production," and show cost savings with excellent finish and long life. Ask for a Macklin Sales Engineer to give you detailed information. No obligation. Specify Macklin Grinding Wheels for all types of grinding machines.

MACKLIN COMPANY

JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

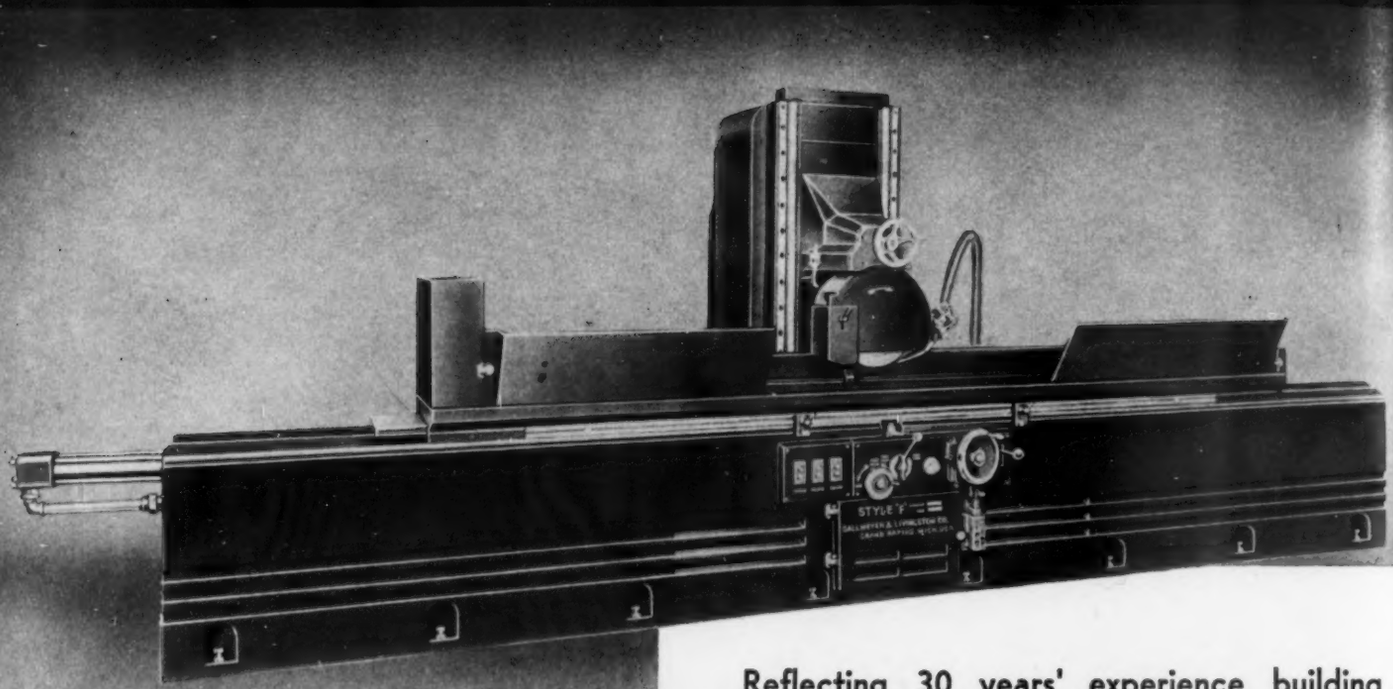
Sales offices: Chicago, New York, Detroit, Pittsburgh, Cleveland, Cincinnati, Milwaukee, Philadelphia.

MACKLIN

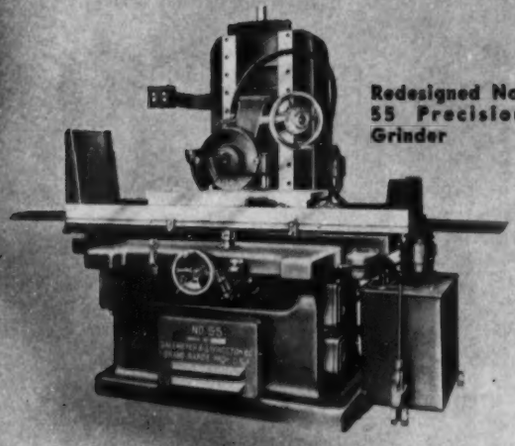
INTRODUCING A NEW SERIES OF SEVEN

"GRAND RAPIDS"

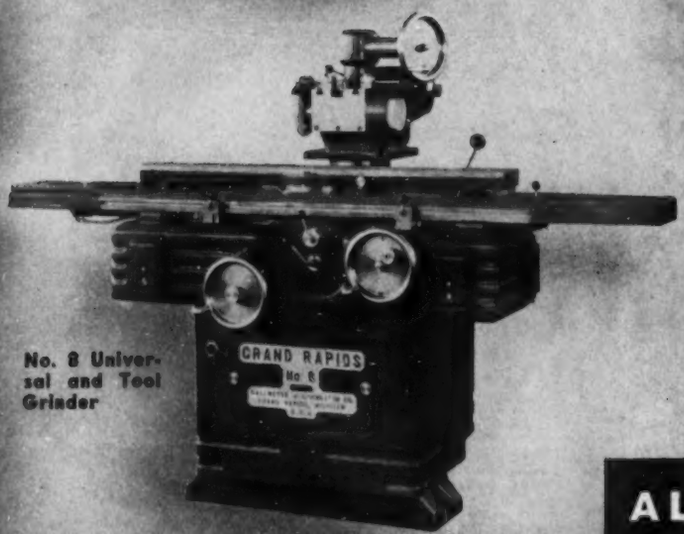
PRECISION GRINDING MACHINES



Style "F" Production Type Grinder



Redesigned No. 55 Precision Grinder



No. 8 Universal and Tool Grinder

Reflecting 30 years' experience building precision grinding machines . . . the last ten years of which have been devoted almost exclusively to the perfecting of hydraulic feed machines . . . GALLMEYER & LIVINGSTON presents a comprehensive display of precision and production type hydraulic feed surface grinders, universal and tool grinders, and tap grinders. All demonstrate their ability to cut costs and improve operations in both production plants and tool and machine shops. This new series of seven "Grand Rapids" precision machines offers the very latest equipment for every grinding purpose. Write us for full details and prices.

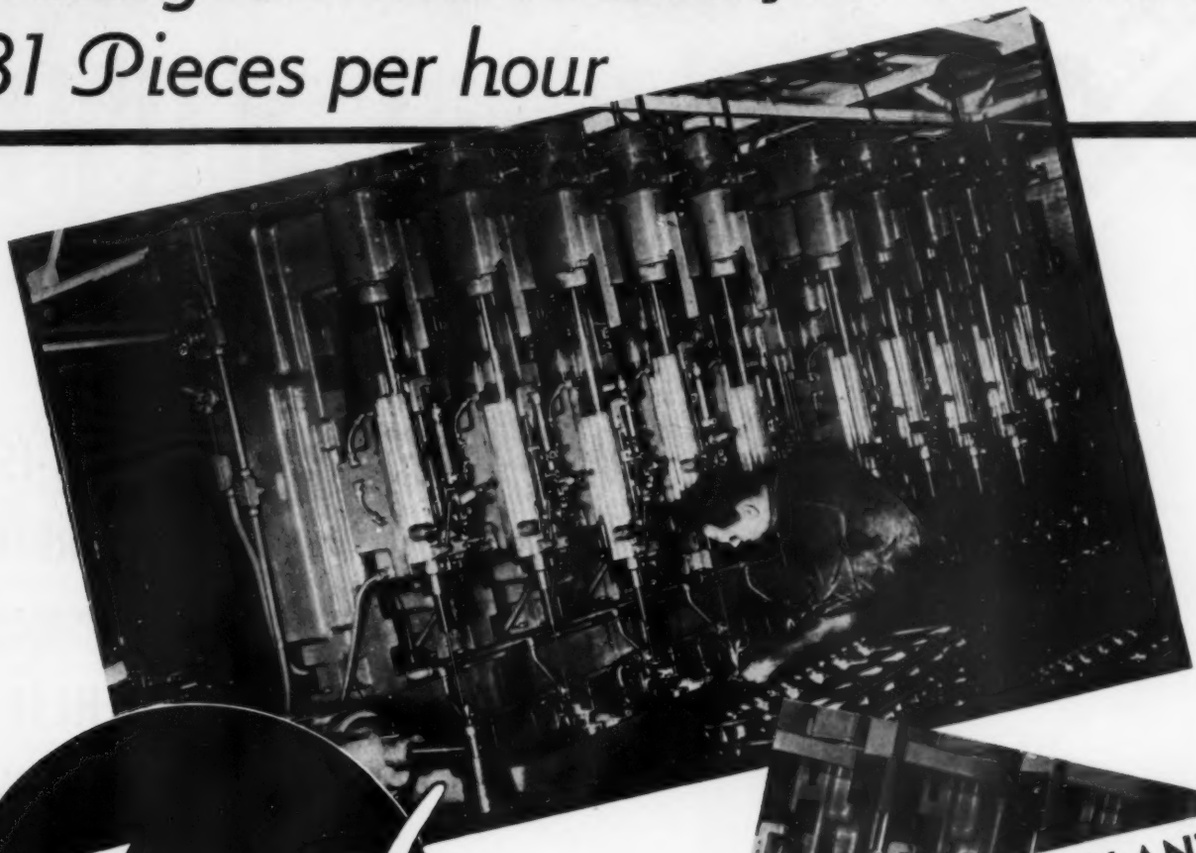
GALLMEYER & LIVINGSTON CO.

330 Straight Ave., S.W.

GRAND RAPIDS MICHIGAN

ALSO FOUR OTHER MACHINES NOT ILLUSTRATED HERE!

Drilling 7/32" holes in connecting rods at the rate of *181 Pieces per hour*



Avey

DRILLING MACHINES IN A LEADING MOTOR TRUCK PLANT

Two Size #2 Type BMA-1 Avey 5-spindle Drilling Machines are speeding hole production in this modern automotive plant. Holes 5½" in depth are drilled in connecting rods of 1040 drop forge steel. Run out limits + or — .010". Production—one operator—181 rods per hour.

Modern Aveys everywhere are meeting requirements for accurate, low cost drilling as well as tapping and reaming. Explore their possibilities on your work. See this deep hole drilling operation, as well as demonstration of other standard and special-purpose AVEY machines at the MACHINE TOOL SHOW—Cleveland—Booth No. 5111—October 4-13.

AVEY DRILLING MACHINE CO.
CINCINNATI OHIO, U.S.A.

America takes its hat OF THE MACHINE

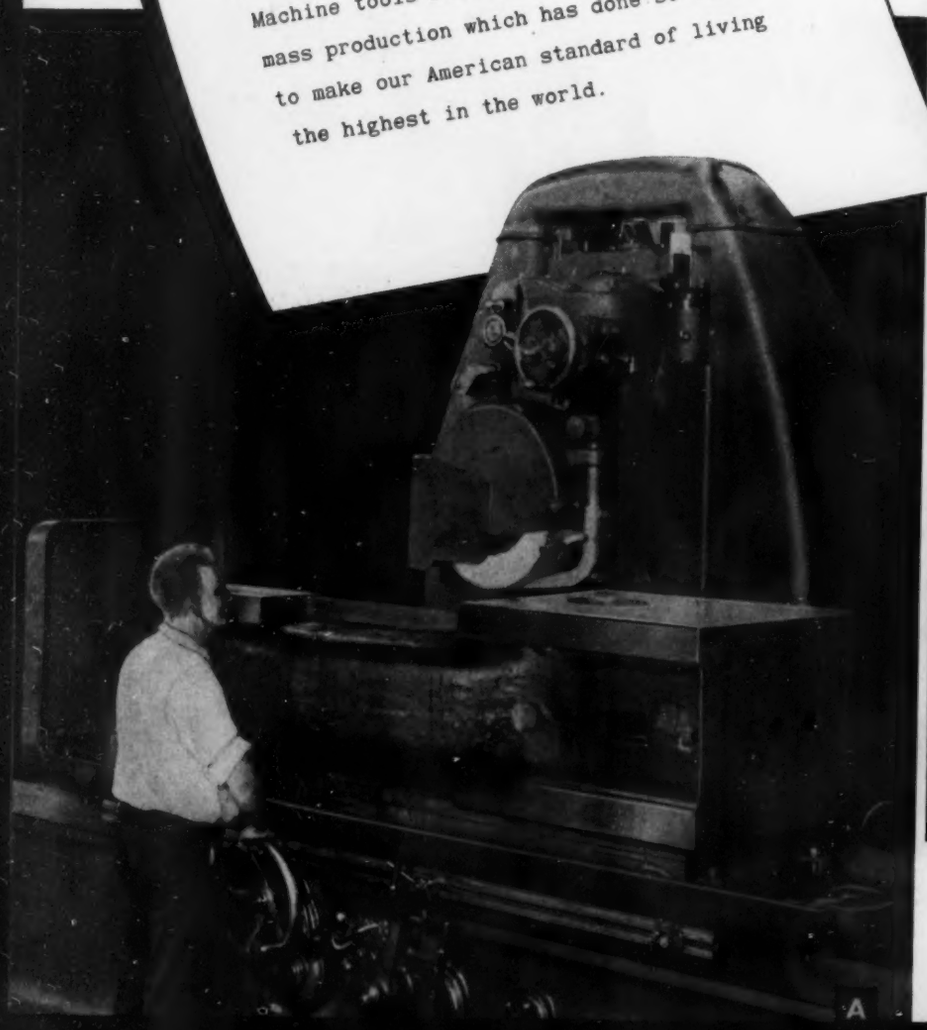
S. C. HOLLISTER,
DEAN OF THE ENGINEERING COLLEGE
CORNELL UNIVERSITY, *says:*

COLLEGE OF ENGINEERING
CORNELL UNIVERSITY
ITHACA, NEW YORK

S. C. HOLLISTER, Dean of the College

The master craftsmen who design and make the marvelous machine tools of today are largely responsible for the tremendous advance of our modern civilization. Machine tools make possible the precision mass production which has done so much to make our American standard of living the highest in the world.

CARBORUNDUM IS PROUD TO CONTRIBUTE TO THEIR SUCCESS IN THESE 2 IMPORTANT WAYS →



A·B·C... In the building of the thousands of machine tools, from the grinding of massive base castings to the highly accurate operating parts, grinding wheels by Carborundum render a great

off to the MASTER CRAFTSMEN TOOL INDUSTRY

PRECISION MASS PRODUCTION CREATES HIGHER STANDARDS

1. Carborundum Brand Abrasive Products are among the most indispensable tools used by the Machine Tool Industry. They play an important part in the actual building of the machines themselves . . . in bringing about their mechanical perfection . . . from the grinding of the base castings to the highly accurate grinding and finishing of such precision parts as bearings, spindles, feed mechanisms, lead screws, gears, ways and face plates.

2. Carborundum works hand in hand with the Machine Tool Industry in the development of grinding methods and the application of grinding machines . . . not only keeps abreast of each new advance, but is often ahead of it. A new grinding method, a new grinding machine, a new material to be ground may come up overnight. If production is to start, Carborundum must be ready with the right wheels to meet the new condition. Carborundum research is constantly at work meeting the grinding problems of today . . . and tomorrow.

(Carborundum is a registered trade-mark of The Carborundum Company)

F

D

E

G

D *New high levels of precision, finish and production have resulted from the development of roll grinding wheels by Carborundum.*

E *Carborundum has made an outstanding contribution in the development of wheels for the modern centerless grinder.*

F *Carborundum research is responsible for much of the pioneering in thread grinding, and the development of suitable wheels for this operation.*

G *Another Carborundum achievement has been the development of tool room grinding wheels for the production of precision tools.*

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N.Y.

Be sure to see the new Henry & Wright

"SPEEDMASTER" DIEING MACHINE

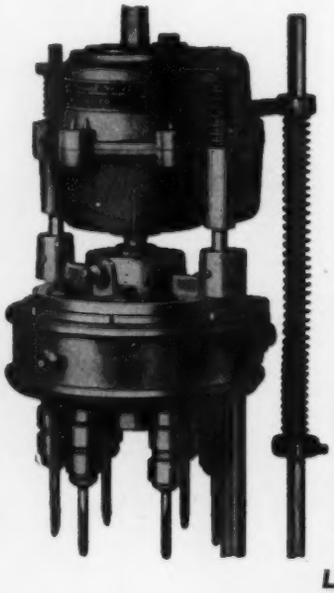
Henry & Wright Standard Model and Speedmaster Dieing Machines produce an endless variety of parts for the electrical, automotive, radio, and various other metal working industries. These machines are also used for the production of a wide assortment of ordnance items. Dieing machines are outstanding for high production with high precision of product.

New high speeds on ALL stamping operations!

Due to a new specially designed counterbalancing arrangement and numerous other added features, the "Speedmaster" gives top-speed production at rates far greater than heretofore obtainable on FORMING, DRAWING and EXTRUDING, completed stampings being produced at each stroke. It runs progressive dies incorporating these operations, at speeds formerly possible only on simple blanking and piercing. Originally scheduled for the Show, the "Speedmaster" may be seen in operation at our factory, or we will gladly mail you full particulars.

HENRY & WRIGHT MFG. CO. HARTFORD CONN., U. S. A.

Ettco-Emrick



SMALL MULTIPLE SPINDLE TAPPING AND DRILLING HEADS

"EVERY PART IN STOCK EXCEPT THE HOLES"

A STANDARDIZED SYSTEM

ETTCO MULTIPLE HEADS are manufactured. Hundreds of cases — thousands of gears are in stock. Delivery service is at times within 24 hours.

They are made up of interchangeable units. The ultimate cost of the heads is the lowest of any made.

Your manufacturing is 100 to 500% faster and a better job.

Small multiple tapping is a new art. We'll engineer your job and show you how to tie the head to fast work holders for the ultimate in production and accuracy.

Let us have a drawing or part for quotation.

ETTCO TOOL CO.

590 JOHNSON AVE. BROOKLYN, N. Y.

SPEED — ACCURACY — VERSATILITY

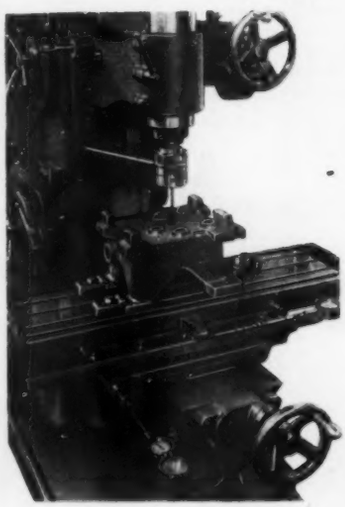
MORE and BETTER WORK AT LOWER COST

Are you looking for these advantages in a MILLER?

Then

INVESTIGATE THE BRAND NEW No. 20 KNIGHT—

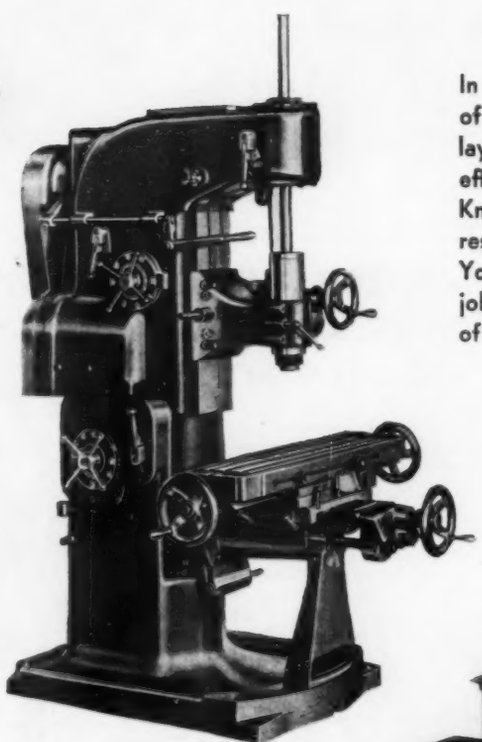
ANNOUNCED FOR THE FIRST TIME TO THE METAL WORKING INDUSTRY!



PRECISION BORING

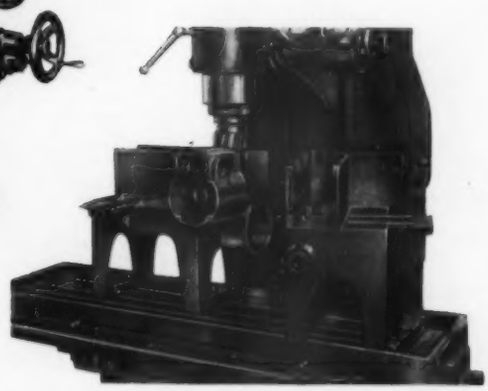
●

Centralized and convenient controls—easy reading and quick operating dials—a counterbalanced spindle head for quick vertical adjustment and a tilting and swiveling table unit are some of the features that make this new Miller an investment that will return its cost over and over again. Put it to work and cut your milling costs.



In less time—with the least amount of equipment—with many hours of layout time eliminated and with less effort for the operator, this New Knight Miller will turn out quality results on a wide variety of work. You'll find it a profit maker on every job you give it to handle, regardless of quantity.

●



FACE-END AND SIDE MILLING

Send for illustrated Bulletin No. 120 which will give you just the information you need to appraise the possibilities of the new No. 20 Knight Miller on your work.

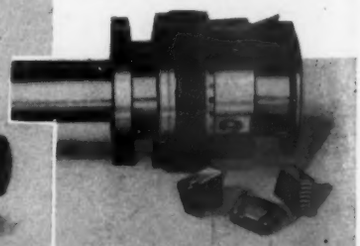
W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •

THREADING SPECIALISTS -- for 25 YEARS

R-S Model B Collapsible Tap, Stationary Type (illustrated), also available in Revolving Type. External Trip Micrometer-adjusted by knurled ring.

R-S Semi-Automatic Threading Machines—Double Spindle type (illustrated) for spark plug and similar second operation threading, also made in single spindle type.

R-S Adjustable Boring Heads available in 3 sizes.



R-S Model C Die Head Revolving Type, Yoke Controlled (illustrated). Model F is the stationary type.

The RICKERT-SHAFER Co., Erie, Pa.

Specialists in ACCURATE THREADING *at* GUARANTEED LOW COST

DIE HEADS ✻ TAPS ✻ CHASERS ✻ BORING HEADS

THREADING, TAPPING AND CUT-OFF MACHINES

WRITE FOR DATA CATALOG and PRICES

WALTHAM

TRADE MARK

REGISTERED US PAT. OFF.

MODERN THREAD MILLERS FOR PRECISION PRODUCTION OR TOOL ROOM REQUIREMENTS . . . . .

SPECIFICATIONS

Swing over carriage—3"

Capacity—diameter of work 2" or smaller

Length of thread cut: 8¾" for work held on centers; 10" for work held by chuck.

Dia. hole through chuck—⅝"

Dia. hole through work spindle—¾"

Distance between centers—max. 12"

OTHER WALTHAM COST CUTTERS

Automatic Pinion and Gear Cutting Machines, Cylindrical Sub-Presses in both arch and overhang types, with or without dies. Full details on request.

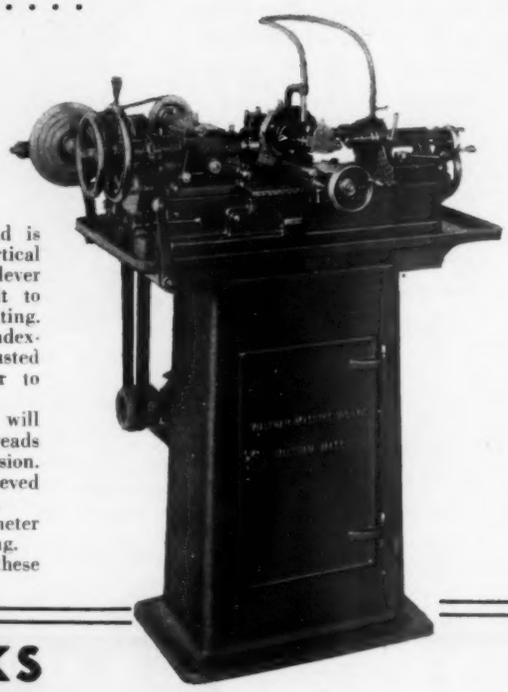
The Waltham Thread Miller is particularly adapted for the production of precision threads and worms up to two inches in diameter.

These units—for bench or floor use—provide facilities for holding work by spring chuck, jaw chuck or on centers. A cross adjustment is provided for aligning centers or for work having a slight taper. Cutter head is mounted for horizontal as well as vertical swivelling—Cross slide is provided with lever for withdrawing cutter and returning it to original position without altering its setting. Work spindle is provided with a simple indexing device. Position of cutter may be adjusted sideways to provide matching of cutter to threads already cut.

Because of its versatility, this machine will cut V., N.S., Whitworth and Buttress threads of special types with facility and precision. It can be equipped with headstock for relieved taps and hobs or for multiple cutter work.

We are prepared to furnish small diameter cutters for thread milling and gear cutting.

Investigate the possibilities offered by these machines on your work.



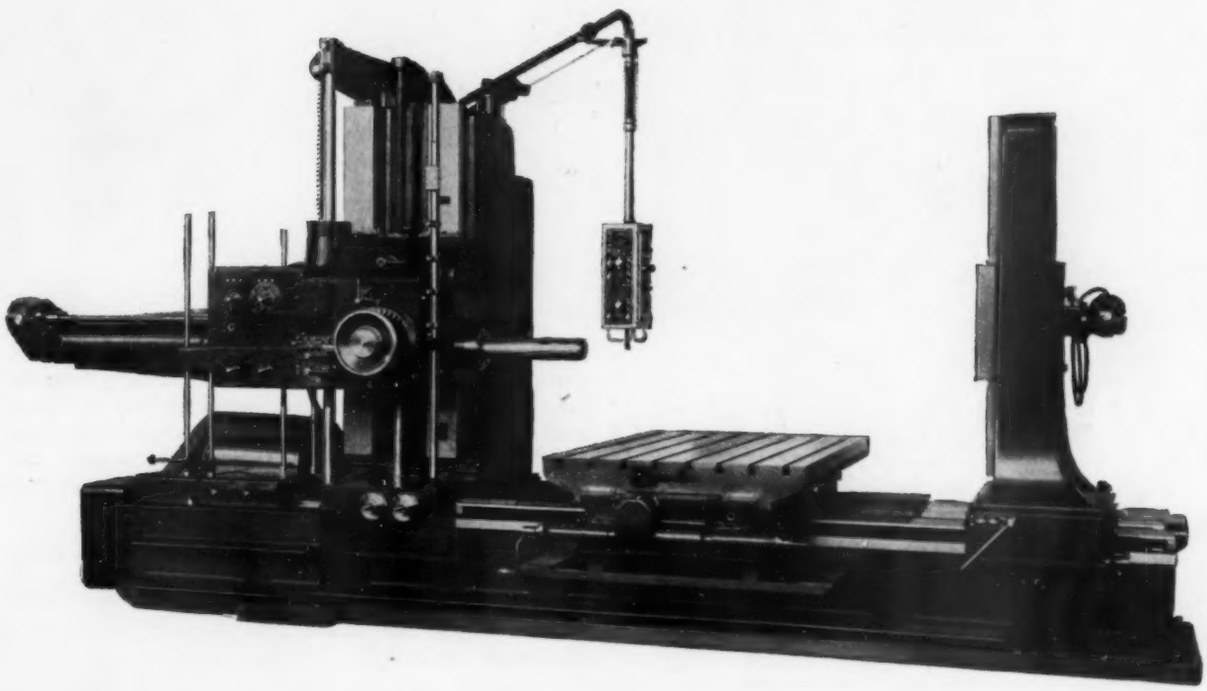
WALTHAM MACHINE WORKS

HIGH STREET . . . . . WALTHAM, MASS.

Announcing

The NEW Large LUCAS

Horizontal Boring, Drilling and Milling Machine

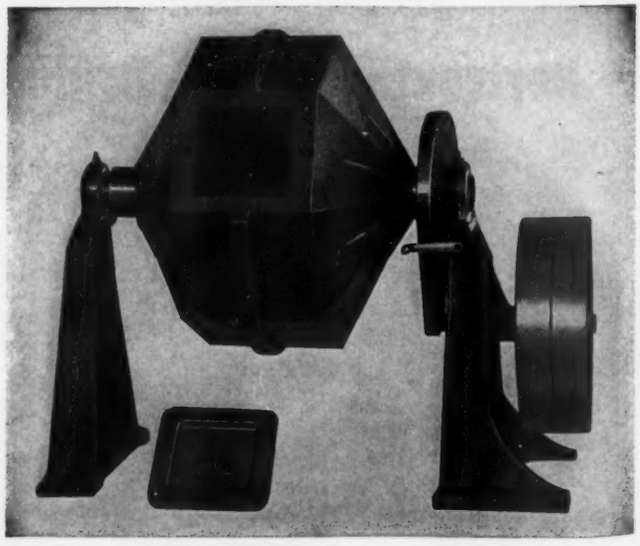


with MULTI-POSITION ELECTRIC PENDANT DIRECTIONAL CONTROL

THE LUCAS MACHINE TOOL CO., 523 East 99th St., Cleveland, Ohio

The Hartford "TRIPLE-ACTION" TUMBLING BARREL

. . makes big savings in grinding and finishing of small metal parts



Here's what TRIPLE ACTION means . . .

The unique shape of the HARTFORD produces "over and over, end-to-end, folding-in" motions which combined cause an action comparable with that of water flowing over a waterfall where a churning in of back water occurs from each side as it flows up to the head of the pool.

This same kind of action in the Hartford quickly grinds off burrs and at the same time smooths the surfaces of parts in the barrel, giving them a superior finish.

HARTFORD TRIPLE ACTION CUTTING BARRELS are made in two sizes, 10 cu. ft. and 4 cu. ft. capacity in both belt or motor driven types. Complete details on request.

Hartford has applied a unique multiple action to Cutting Barrel design, an action which insures vastly superior work in shorter time and at lower cost than hand finishing methods. Actually the words *Tumbling Barrel* do not adequately describe this equipment, as it is really a highly efficient *Surface Finishing Machine.*

In one case, a "Hartford" produced in one hour, work which previously required eight hours. In another case 3,000 pieces were finished in a "Hartford" in the same time required to handle 90 pieces by hand.

The "Triple Action" feature quickly grinds off burrs, uniformly finishes and smooths the surface of every piece in the load.

The "Hartford" is particularly fast and economical on wet grinding or sand rolling with sand and water. It is also adapted for use with oil and emery and other abrasives. Regardless, however, of the service—whether for wet or dry grinding, pulverizing or mixing, the "Triple Action" results in superior speed and thoroughness of work at big savings over ordinary methods.

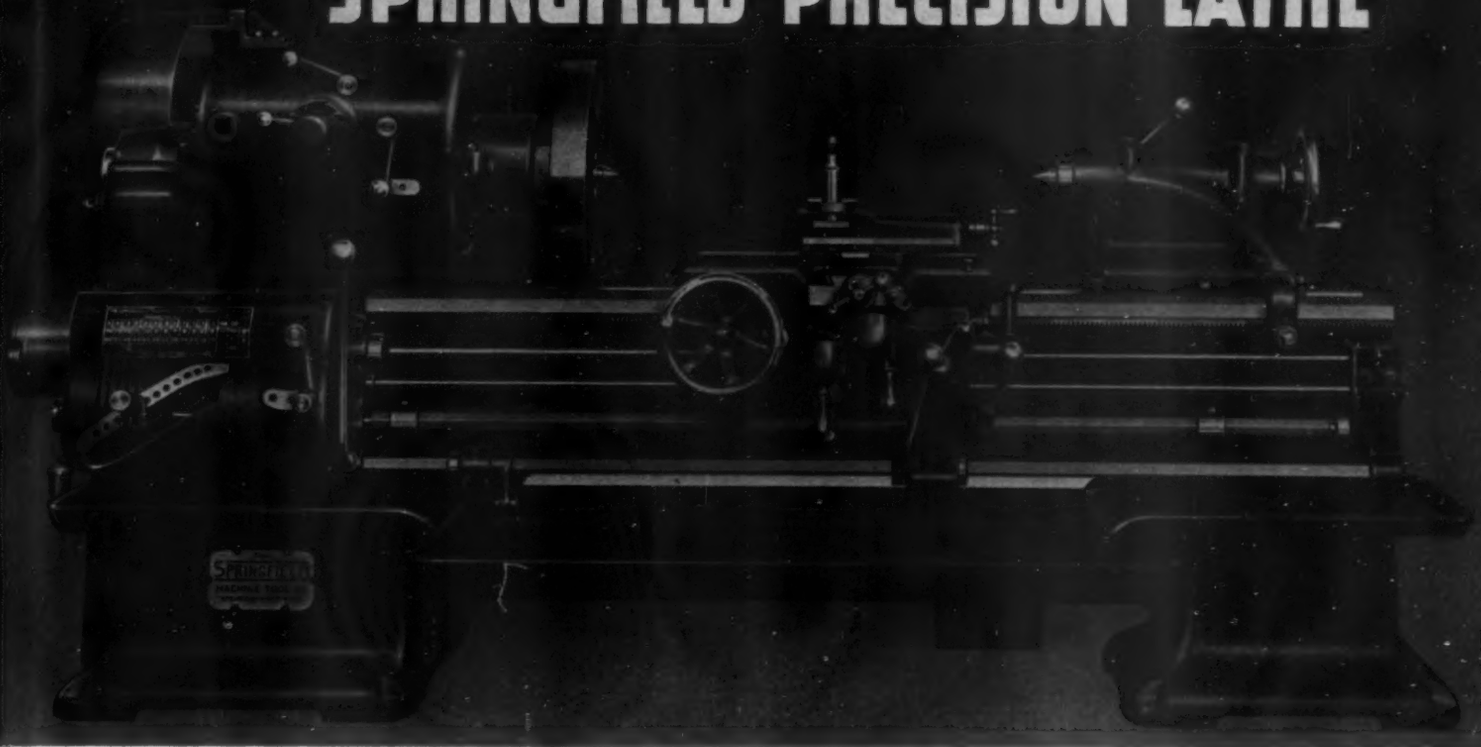
It will pay you to investigate the possibilities offered by the "Hartford" on your own work.

THE HARTFORD STEEL BALL CO.

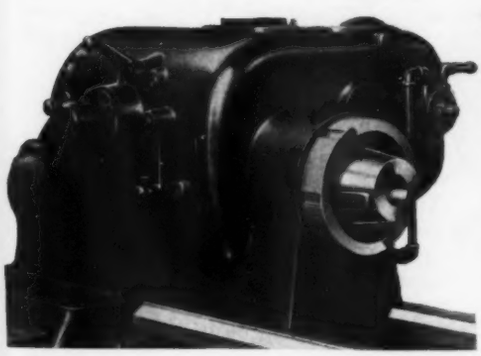
HARTFORD, CONNECTICUT

NEW YORK, CLEVELAND AND CHICAGO

Performance-Perfecting Features OF THE SPRINGFIELD PRECISION LATHE



No. 1 - This Headstock Assures More Flexible and Speedy Production!



Write Now for Bulletin No. 162

It describes and explains *all* construction and operation features that make Springfield Lathes faster precision units for your shop!

The Springfield Machine Tool Company, long a leader in the manufacture of fine metalworking machinery, takes pride in pointing out the various technical innovations in design and construction that have established this tool room lathe's record for accuracy under high production pressure.

For instance . . . the *headstock* is fitted with helical back gear train, using 14 large chrome molybdenum hardened and lapped gears (ground if preferred), only 7 of which mesh at one time. This keeps gears properly placed, whether in use or idle.

Back gear clutch is splined on spindle, as well as into face gear and cone sleeve. All drive shafts and the maindrive pulley are splined and mounted on highgrade ball bearings. The spindle is mounted on Timken Precision Taper Roller Bearings in solid housings. All bearing and gears not sealed are spray-lubricated by pump mounted on main drive shaft from a cool oil reservoir in leg.

Heavy disc clutch located in pulley is controlled by levers at apron and gear box. These levers also operate a large friction brake for stopping spindle.

THE SPRINGFIELD MACHINE TOOL COMPANY.

SPRINGFIELD, OHIO, U. S. A.

FRONT PAGE NEWS!

HOWELL *Adds* Smart Appearance to PROVEN PERFORMANCE

Famous Type K *Now Streamlined*

TOTALLY-ENCLOSED and FAN-COOLED

½ to 75 H.P.

By switching to HOWELL Type K—"America's Smartest Electric Motor"—many machinery manufacturers are definitely improving their product appearance.

Inwardly the HOWELL Type K has not been changed. It's exactly the same motor which for the last ten years has given such phenomenal service on thousands of jobs.

But outwardly, Ah, that's a different story! Now the Type K is STREAMLINED. Its new all-steel housing adds beauty, trimness—eye appeal.

And more! As compared to cast iron, the all-steel housing promotes SAFETY for machine tool operators against flying metallic particles should an accident occur. And more! The all-steel housing results in LIGHTER-WEIGHT by approximately 18%—also greater COMPACTNESS.

Practically any machine tool builder can change to HOWELL without expensive design alterations, since every size is built to NEMA Frame dimensions.

HOWELL MOTORS — Make Good on Hard Jobs

And Every Motor Given a PRECISION BALANCE!

Motor is placed on 1-inch live rubber pad and, when operating at FULL speed, is ACCURATELY vibrometer tested. This close-limit check-up assures PERFECT balance of rotor assembly and bearings. With HOWELL this is standard practice.

Write for Bulletin K which gives complete information on this newest motor development.

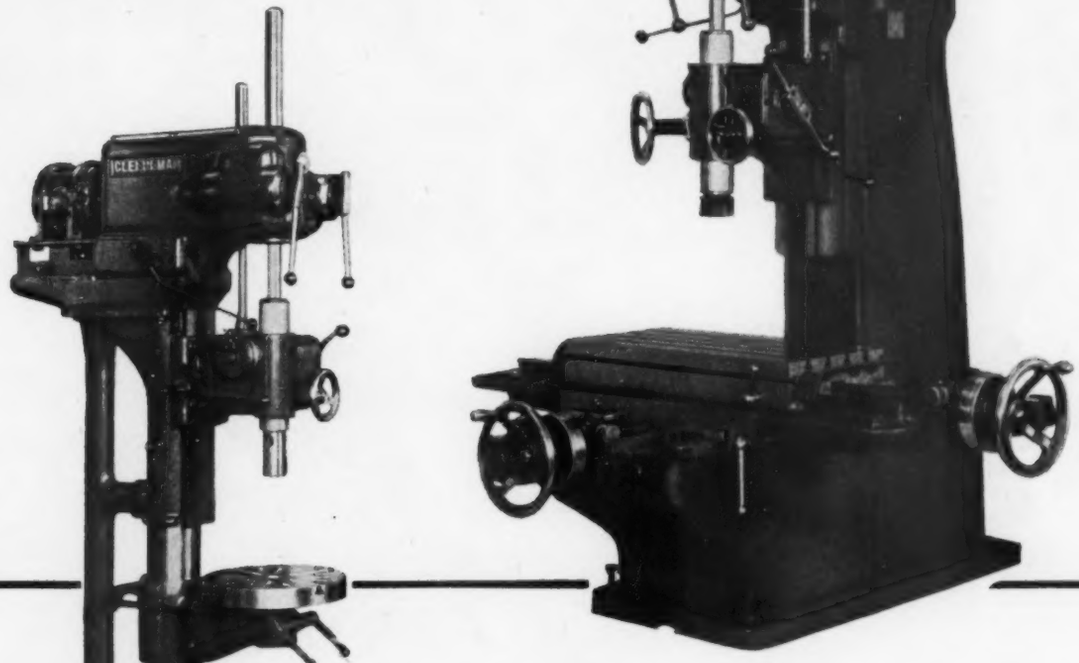
HOWELL ELECTRIC MOTORS COMPANY
HOWELL, MICHIGAN
Representatives In All Principal Cities

Show or No Show

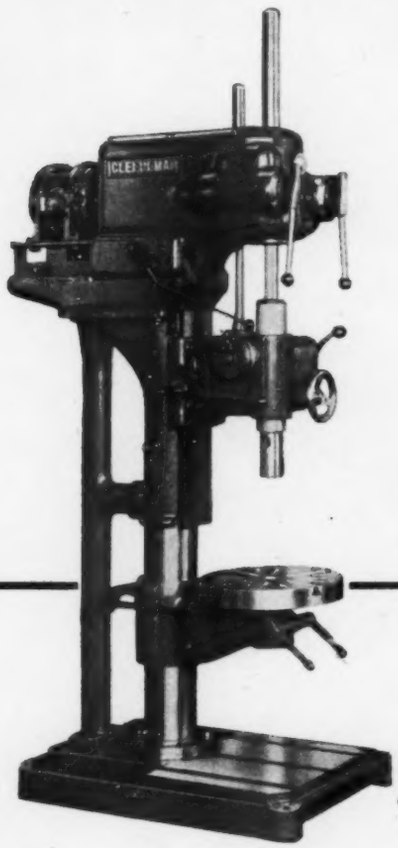
CLEEREMAN LEADS!

FROM COAST TO COAST . . .

CLEEREMAN Round and Box Column Drilling Machines and Jig Borers are setting new records in tool rooms and manufacturing departments of numerous leading industrial plants, army air depots and arsenals. Investigate CLEEREMAN economy, accuracy and ruggedness.



CLEEREMAN JIG BORER



CLEEREMAN ROUND COLUMN DRILLING MACHINE

CLEEREMAN MACHINE TOOL CO., GREEN BAY, WISCONSIN

ADDRESS MANUFACTURER'S SALES DIVISION

BRYANT MACHINERY & ENGINEERING COMPANY

400 WEST MADISON STREET, CHICAGO

DEALERS IN PRINCIPAL CITIES

Write for New Bulletin

...W-S RESPONDED WITH THIS *Triple Duty* PRESS

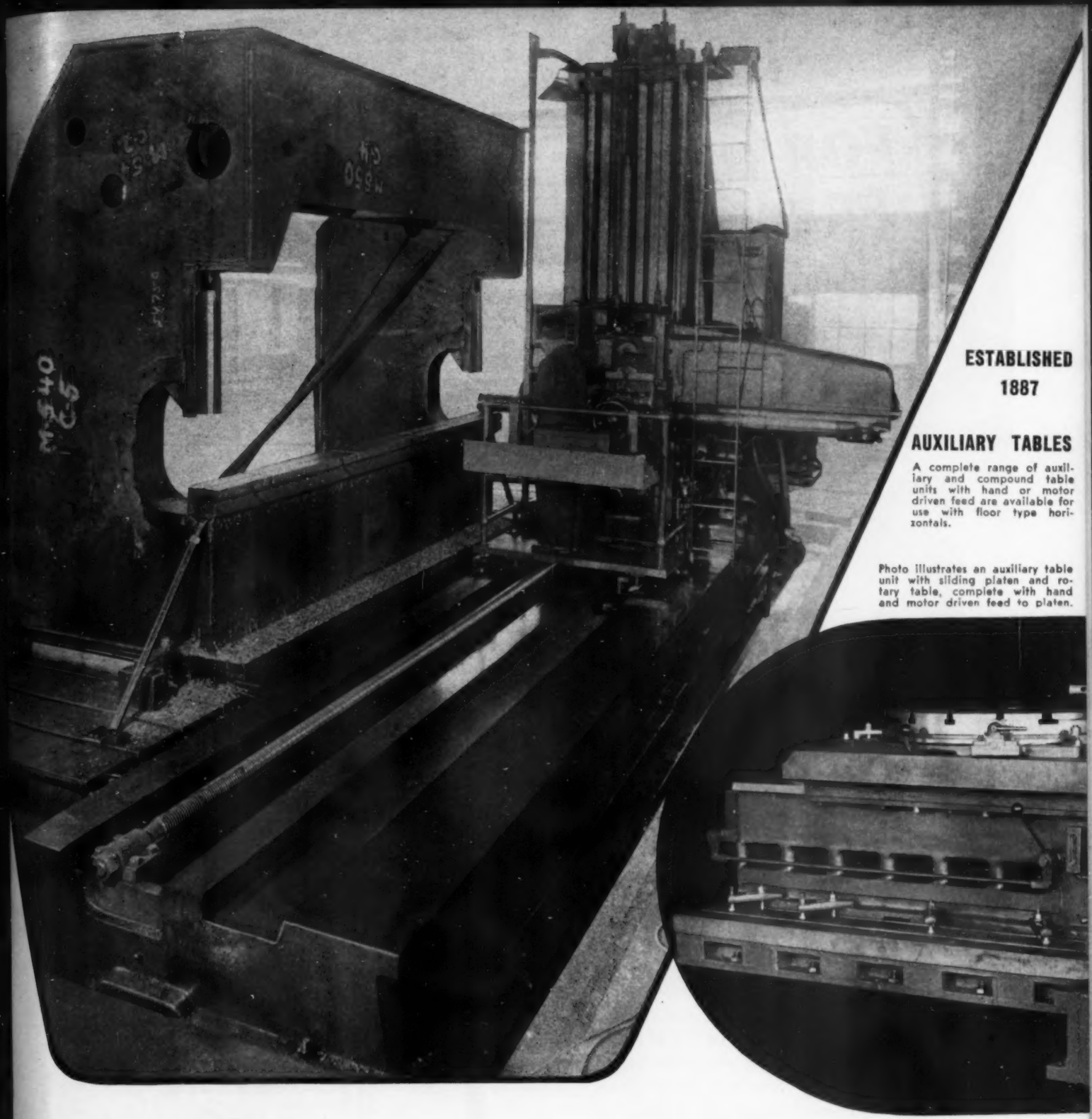
Press loads five springs. The five dies are electrically heated to 900° F.—and the three minute pressure is applied simultaneously on all five. This press has 18" ram, 20" stroke, 80" opening.

DRAWING, TEMPERING AND RESTRIKING in one continuous operation . . . this 250 ton W-S hydraulic press fully achieved a big automotive plant's desired improvements in clutch spring plate production. A special engineering job, of course.

That greater efficiency you yourself are looking for—in bending, forming, extruding, straightening, forcing, forging, stamping or die sinking—perhaps may be found in a standard W-S metal-working machine. Exclusive W-S devices insure accuracy at top speed . . . faster production at lower costs.

But, if it has to be a special machine, the necessary original designing and construction are part of W-S regular engineering routine. Consultation obligates you in no way.

THE WATSON-STILLMAN COMPANY, ROSELLE, N. J.



ESTABLISHED 1887

AUXILIARY TABLES

A complete range of auxiliary and compound table units with hand or motor driven feed are available for use with floor type horizontals.

Photo illustrates an auxiliary table unit with sliding platen and rotary table, complete with hand and motor driven feed to platen.

• POWER
• PRECISION
• CONVENIENCE

. . . Now more important than ever with time and production space at a premium

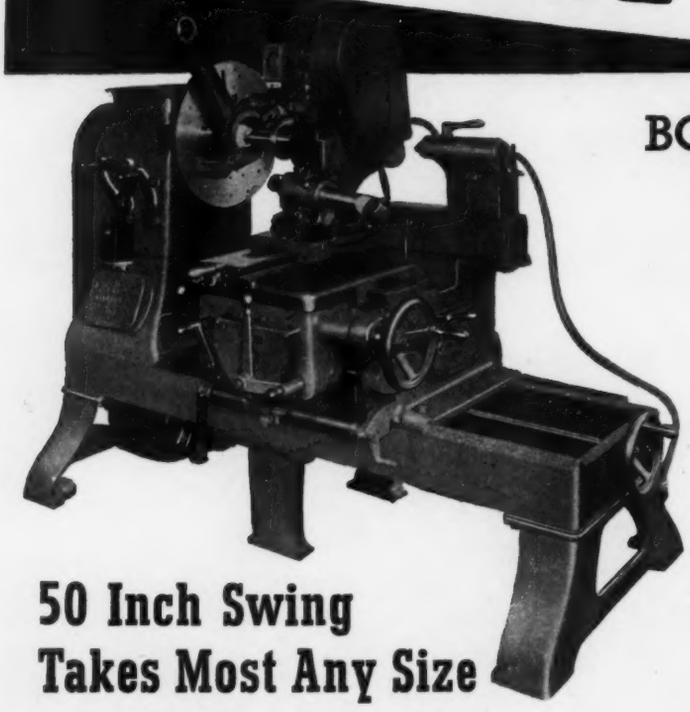
• These three factors are carefully engineered into the design of Ohio Horizontals. These modern machines are built to whip your large jobs quicker and at less cost, being capable of completely machining the job without removing it to other machines. The machine illustrated, for instance, is handling all machining operations on a large fabricated steel press, brake frame. Specifications are 6″ Spindle, 72″ Vertical Travel and 240″ Horizontal Travel of the spindle. WRITE US TODAY FOR FULL DETAILS!

SHAPERS OHIO DREADNAUGHT PLANERS

HORIZONTAL BORING, DRILLING *and* MILLING MACHINES

THE OHIO MACHINE TOOL COMPANY • • • KENTON, OHIO

FOR HEAVY DUTY PRECISION JOBS.. I'LL TAKE LEMPCO'S DU-ALL



50 Inch Swing Takes Most Any Size

Put the LEMPCO DU-ALL to work and cut production cost on ten or more jobs. Standard equipment includes reversible water pump and six foot bed. Any size bed can be provided on order. Here are a few jobs the LEMPCO DU-ALL can handle for you: General Internal Grinding, Surface and Face Grinding, General External Grinding, Large and Small Connecting Rods, Surface and Face Turning, Blanking Dies, Deep Drawing Dies, Forming Dies, Turning and Boring.

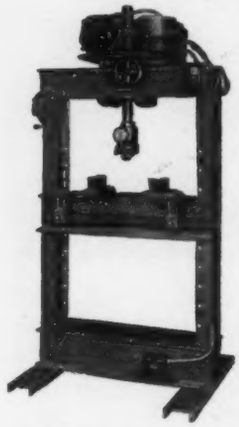
MAKE US PROVE IT—SEND FOR CATALOG

(A few territories still open for dealers)

BORE and GRIND on the 50 INCH SWING

LEMPCO "DU-ALL"

This is the machine that is now filling a big gap in the industry. The LEMPCO DU-ALL's 50 inch swing and precision grinding and turning turret-head does the work of two far more costly machines. Quality construction throughout assures the last word in accuracy on all jobs.



LEMPCO All Purpose Presses

~

Up to 60 tons Pressure

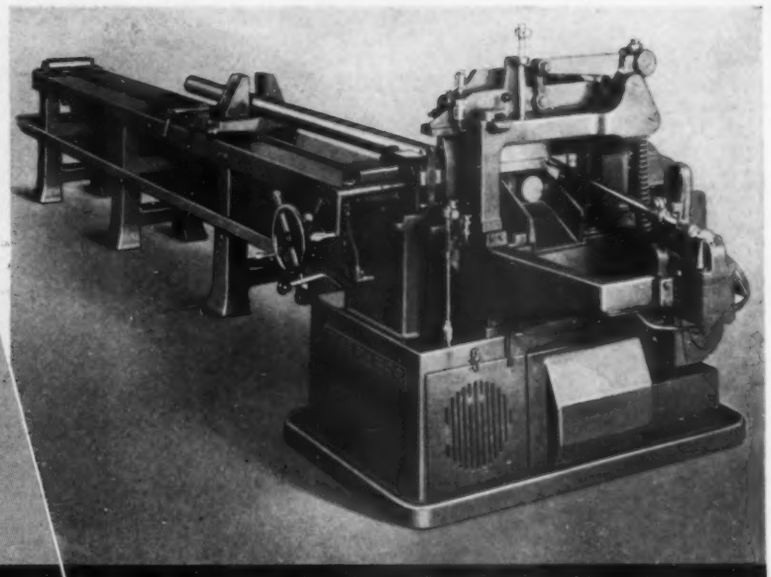
~

Built to "take it"

Install a Lempco Press in your shop today for pressing on arbors, setting dies or any one of the many jobs that call for a power or hydraulic press. There are different models, all of heavy I-beam and channel construction, priced to fit any shop. Write for catalogs giving all the details.

LEMPCO PRODUCTS, INC. · BEDFORD, OHIO

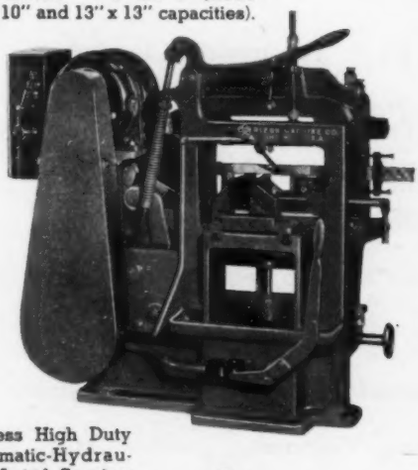
Peerless High Duty (Automatic-Hydraulic) Metal Sawing Machine with bar feed — 6" x 6".

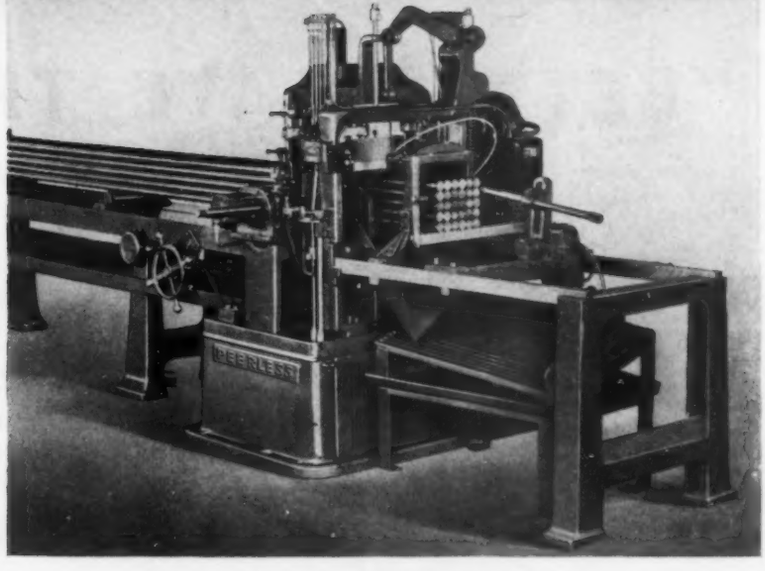


Fastest Work
Fewest Blades
Lowest Upkeep

TOPS IN METAL SAWING

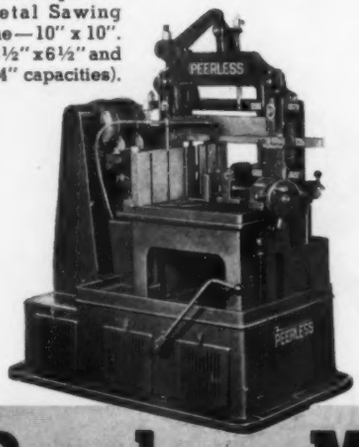
Peerless Universal Type for All-purpose production sawing of any metal — 6" x 6". (Also 10" x 10" and 13" x 13" capacities).





Peerless High Duty (Automatic-Hydraulic) Metal Sawing Machine with bar feed — 9" x 9".

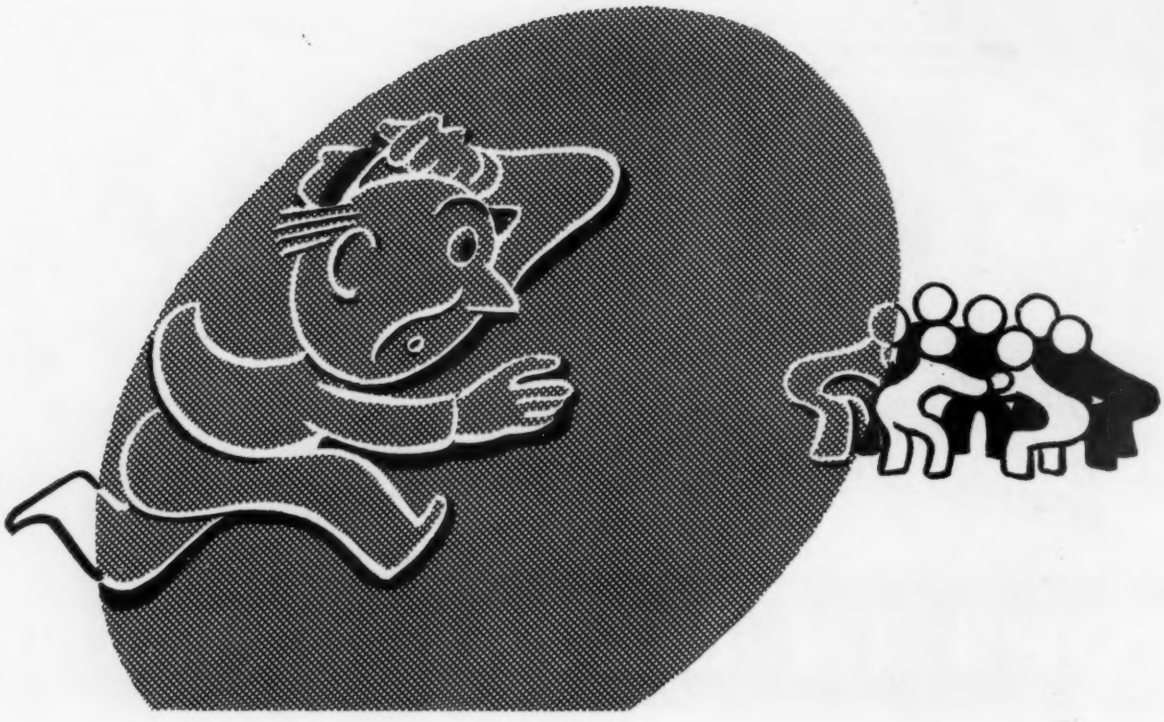
Peerless High Duty (Automatic-Hydraulic) Metal Sawing Machine—10" x 10". (Also 6½" x 6½" and 14" x 14" capacities).



It is a revelation to most shop men to see Peerless Hydraulic Automatics (with or without bar feed), Universals, Standards, and Verticals cut off lengths of any kind or shape of metal. They are all built for the fastest cutting time and lowest blade and upkeep costs in their classes. The Automatic Machines shown above can, for instance, cut off bar stock such as gear blanks (S. A. E. X-1335) at 230 pieces 1½" round or 15 pieces 6" round per hour floor to floor. Check up on your metal sawing costs, then get our figures for Peerless Metal Sawing on the same work.

PEERLESS MACHINE CO. 1619 RACINE STREET RACINE, WISCONSIN

Peerless Metal Sawing Machines



"BETTER LATE THAN NEVER"

If you are still using so-called "compensating" leads with your Chromel-Alumel couples, now is the time to do something about it. Those "compensating" leads are O. K. over only a narrow low temperature range. But their junction with the couple often gets too hot for accuracy. The error is apt to be more than you want to tolerate. And it may be ±. You avoid at least that source of error by using only Chromel-Alumel leads with your Chromel-Alumel couples. Where they join, no disturbing E. M. F. is set up. So, there is nothing to compensate. For the sake of pyrometer accuracy, send for Folder C-A. . . . Hoskins Manufacturing Company, Detroit, Mich.

Chromel

Hoskins

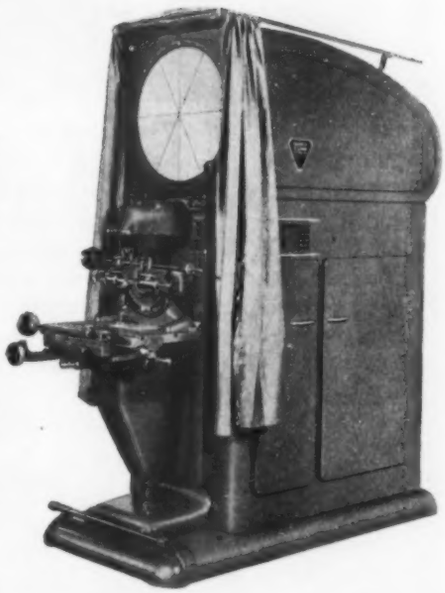
CHROMEL-ALUMEL

LEADS AND COUPLES

The B&L Contour Measuring Projector is a rapid and most accurate instrument for industrial measurement, comparison, and inspection. Checking clearances, radii, angles, cuts and irregular and intricate contours, it is capable of making measurements that are practically impossible otherwise.

In the B&L Contour Measuring Projector, a magnified shadow image of the object under examination is brilliantly projected to a vertical eye-height screen in an erect and unreversed position. Accurate magnifications from 10X to 100X are possible. Angular measurements to 1′ are possible with the protractor screen.

All controls are brought to the front within easy reach of the operator. It is completely enclosed, with readily accessible and ample storage space for accessories, etc. For full particulars write to Bausch & Lomb Optical Co., 619 St. Paul Street, Rochester, New York.



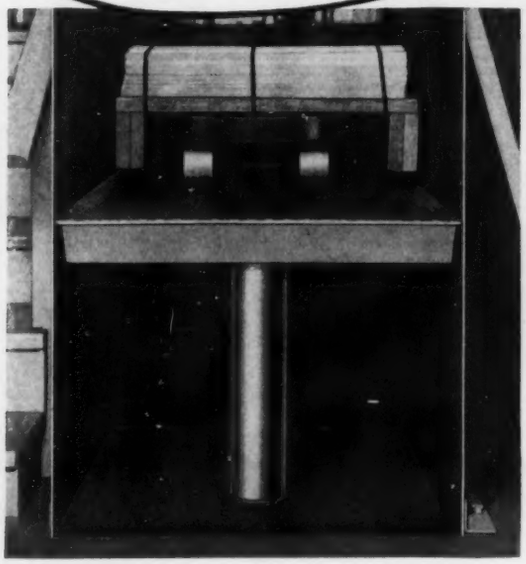
Some of the Many Applications of the
B&L Contour Measuring Projector

Forming tools	Hobs
Sealing rolls	Thread ring gauges
Cams	Dies
Screw threads	Gear teeth
Taps	Jigs
Thread plug gauges	Punches
Lead screws	Formed stampings
Chasers	Knurls

BAUSCH & LOMB

FOR YOUR EYES, INSIST ON BAUSCH & LOMB EYEWEAR, MADE FROM BAUSCH & LOMB GLASS TO BAUSCH & LOMB HIGH STANDARDS OF PRECISION . . . . . .

Reduce HANDLING COSTS with CURTIS Hydraulic Cylinders



Almost every plant has one or more lifting operations that can be done more quickly, more accurately and at *less cost* with Curtis Hydraulic Cylinders. It is the modern, efficient method of material handling that is saving work and money everywhere.

The first cost of Curtis Hydraulic Cylinders is low. They are inexpensive to operate and maintenance is negligible. They soon return the original investment in savings, and continue to give dependable, low-cost service for many years.

Control in raising and lowering is simple and accurate—safely oil-locked at all heights. Use regular shop air lines (or electric oil pump). Capacities up to 16 tons.

Send coupon below for free booklet suggesting applications in your industry.

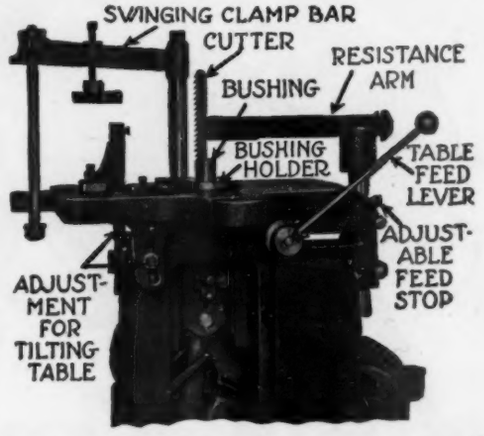
CURTIS Compressors • Air & Hydraulic Cylinders
Air Hoists • I-Beam Cranes & Trolleys

CURTIS PNEUMATIC MACHINERY COMPANY
1924 Kienlen Avenue, St. Louis, Missouri
Gentlemen: Please send data on Curtis Hydraulic Cylinders, and your 28-page booklet, "How Air is Being Used in Your Industry."

Name_____
Firm_____
Street_____
City_____ State_____

NEW TYPE
DAVIS KEYSEATERS
with tilting table

Taper keyways may be cut by inclining table in either direction from horizontal. Scale indicates exact taper per foot. Cutter operates in vertical position, with resistance arm adjusted to different cutters. Table-type feed with graduated collar on feed shaft to indicate depth of cut.



DAVIS KEYSEATER COMPANY
403 EXCHANGE ST. ROCHESTER, N. Y.

1850° to 2300°F Without Blower or Compressed Air

Baker small gas fired furnaces prove that high temperatures can be obtained without blower or compressed air. Noiseless. Easy to install. Economical. There are Baker furnaces for tool rooms, for treatment of high speed steel and a hydrogen furnace for bright annealing, brazing and soldering without flux. Send for catalogue.

BAKER & CO., INC.
High Temperature Furnace Division
113 ASTOR ST. NEWARK, N. J.

...fabricated with AIRCO Machine Gas Cutting

A 25 per cent discount on the purchase price of this important refinery equipment—that in effect is what this company got when they fabricated their heat exchanger from heavy steel plate with an Airco Radiagraph. All circles and beveled edges, as well as straight lines, were quickly, accurately, and smoothly flame cut with a portable, light-weight, Airco Radiagraph. » » » Airco Flame Cutting is the modern, economical method of fabricating steel parts and equipment. Cuts to closer tolerance, makes possible better assembled fits on piping and steel plates. Better fits mean better welds — at less cost. Better products, lower prices. » » » Why not investigate the Airco Flame Cutting Process further? It may be your way to improved products, increased production, or lower manufacturing costs. Full information will gladly be sent from any Airco district office. An inquiry will in no way obligate you.

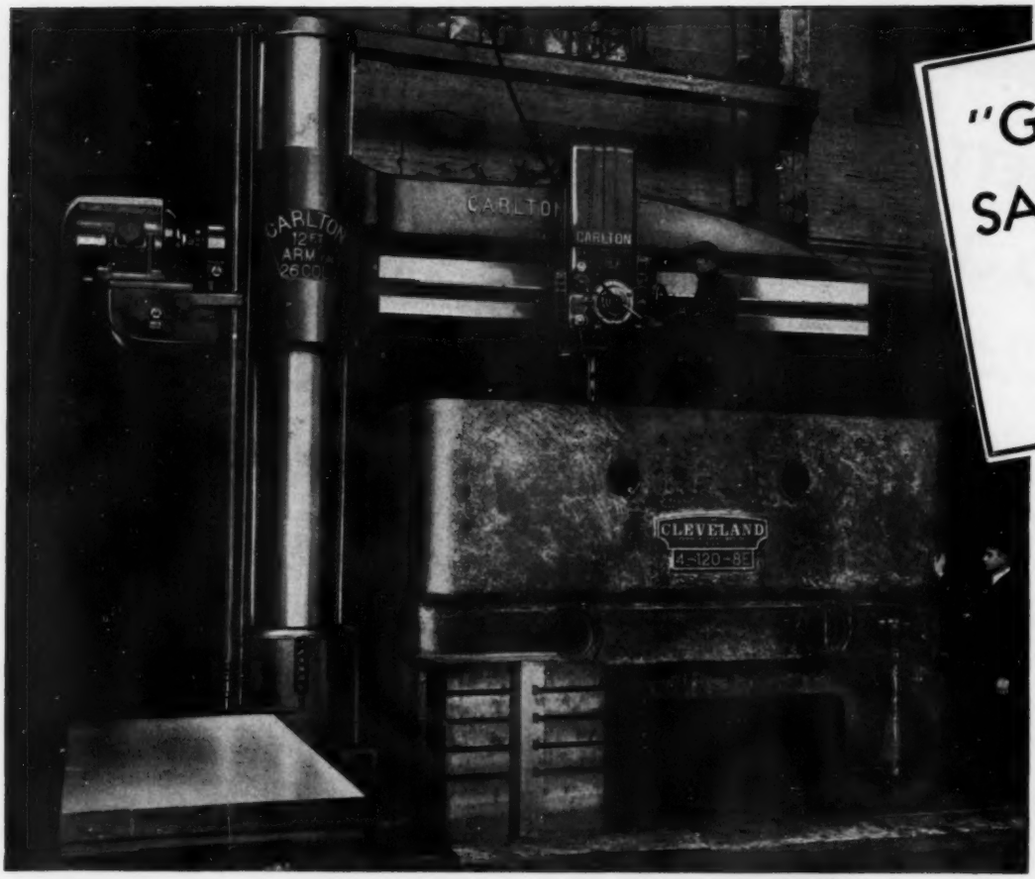
AIR REDUCTION

SALES COMPANY

GENERAL OFFICES: 60 EAST 42nd STREET, NEW YORK, N. Y.

DISTRICT OFFICES IN PRINCIPAL CITIES

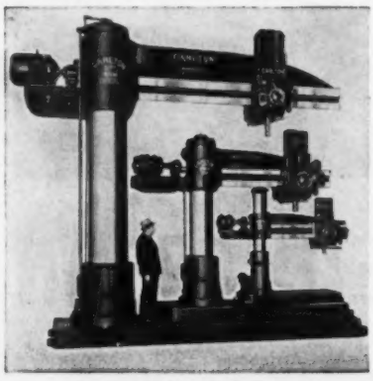
AIRCO *Anything and Everything for* GAS WELDING or CUTTING and ARC WELDING WILSON



"GREAT SAVINGS IN TIME"

CARLTON ALL BALL BEARING LOW HUNG DRIVE RADIALS

The largest, the smallest and an intermediate size Carlton are shown below. Carlton Radials are made in all sizes from the 12′ arm on 26″ column down to the 3′ arm on 9″ column.



The Cleveland Punch & Shear Works reported "great savings in time over previous methods" when they installed the Carlton *All Ball Bearing* Radial illustrated above. Using this 12′ Radial with its 26″ diameter column, and 12′ height between spindle and base, they have found that their largest castings are well within the Carlton's capacity. The casting shown on the machine is 100″ high, 161″ wide, and 87″ deep; it weighs 27 tons. The *low hung spindle drive* and *all ball bearing* construction insure smooth operation and enable the largest drills to be used without distorting the set up. The conveniently grouped controls permit the operation of the Carlton with the head and arm in any position.

We regret very much that the European War made it necessary to postpone the Machine Tool Show as we had prepared a fine production exhibit on various size Carlton Radial Drills. When you are in the market for a Radial Drill give us an opportunity to demonstrate the efficiency of Carlton machines.

If you happen to be in or near Cleveland, why not go to the Cleveland Punch and Shear Works and see the machine illustrated above in operation; it's one of the largest Radial Drills ever built. Learn of the tremendous savings made possible through its increased production. Also there are many other installations of the various size Carlton Radial Drills in Cleveland Manufacturing Plants, as well as in other large industrial plants in this Country. Please investigate before buying.

THE CARLTON MACHINE TOOL CO.

CINCINNATI, OHIO

AND AS A PART
OF YOUR

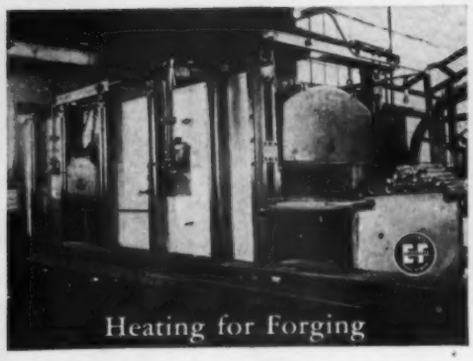
Modernization Program

Consult E F ENGINEERS

FOR WAYS TO:

- Improve the quality of your heat treating.
- Increase your furnace production capacity.
- Reduce the cost of your heat treating operations.

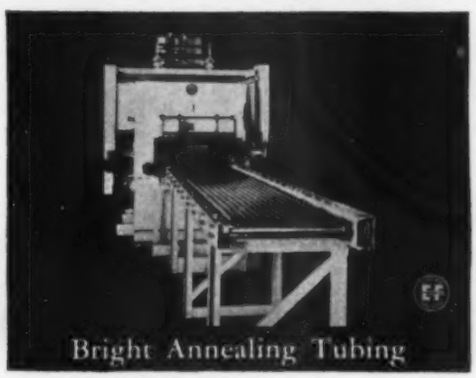
Carburizing Furnaces



Heating for Forging

Copper Brazing

Scale-Free Hardening



Bright Annealing Tubing

Whether it's a case of hardening, normalizing, brazing, annealing, carburizing, enameling, heating for forging or any other heating or heat treating process, E. F. engineers offer you a wealth of experience. They have applied electric, gas or oil-fired furnaces to practically every conceivable industrial heat treating need.

With both electric and fuel divisions, E. F. engineers are in a position to make a thorough and impartial analysis of your problem and recommend the best type for the particular job.

E. F. equipment is marked by certain refinements in design and ruggedness of construction which combine to assure greater efficiency and flexibility of operation, coupled with long-term operating economy.

If you are considering additional furnace equipment or any changes or improvements in your present equipment permit us to study your problem. We will show you just what you may expect from E. F. furnaces in the way of improved quality, increased production and lower operating costs.

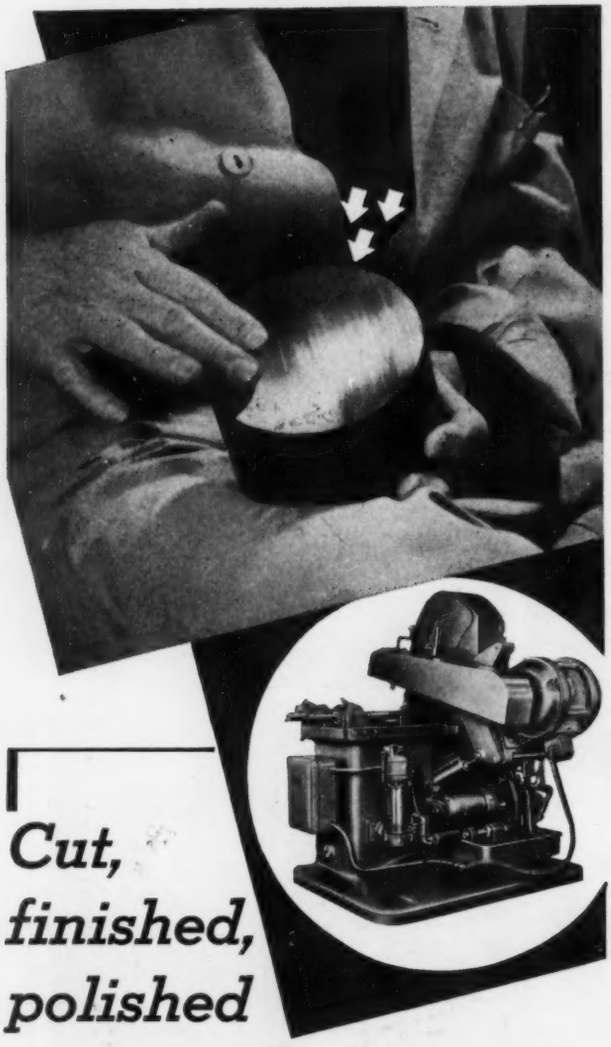
ELECTRIC EF FURNACES FUEL FIRED

Send for 'Printed Matter

The Electric Furnace Co.

SALEM - - - OHIO

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PRODUCT, PROCESS OR PRODUCTION.



Cut, finished, polished

in less than **6** *minutes with a*

CAMPBELL CUTAMATIC

Here's a six-inch round of hard, tough steel that was cut, finished and polished—all in one operation—in less than 6 minutes on a Campbell Cutamatic. A feat like this is possible only because the Cutamatic cuts rapidly without leaving burrs and without burning or case-hardening the material—and because it actually smooths as it cuts.

Write for the booklet "Design for Cutting Costs." It will show you important economies.

BUY ACCO QUALITY *in Campbell Cutting Machines, Ford Chain Blocks, Page Welding Electrodes, American Welded and Weldless Chains, Lay-Set Preformed Wire Rope and Reading-Pratt & Cady Valves.*

ANDREW C. CAMPBELL DIVISION
DESIGNERS AND BUILDERS OF SPECIAL MACHINERY
BRIDGEPORT, CONNECTICUT

See Our Exhibit, National Metal Exposition, Booth M-323 ★

ACCO TRADE MARK

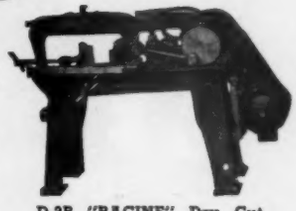
AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

RACINE

HIGH SPEED METAL CUTTING MACHINES

The New "RACINE" Wet Cut Utility saw—A general purpose, high speed, accurate machine. Hydraulic feed — 6"x6" capacity—Smooth quiet performance. A remarkable machine at a very moderate price.

W-3B "RACINE" Wet Cut Utility Saw



The "RACINE" Dry Cut model of the Utility Saw. Hydraulic feed and control gives infinite range of pressures — Accommodates all classes of materials. 6"x6" Capacity. Rugged, durable construction.

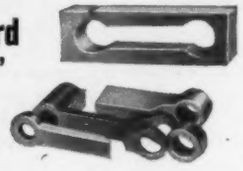
D-3B "RACINE" Dry Cut Utility Saw

Also Heavy Duty Hydraulic Feed machines — Capacities 10"x10" and up. RACINE Shear Cut Screw Feed production saw, RACINE Duplex band saw, etc.

"Standard the World Over"

RACINE TOOL & MACHINE CO.
1751 State Street — Racine, Wis., U.S.A.

DoALL Smashes Record Making Short Run "Forgings"



At Windcharger Corp., Sioux City, Ia., small runs of forgings are made by contour sawing the shapes from solid blocks of steel. They write "This small brake lever would have meant a monotonous day on the shaper for somebody, but sawing it out on your DoAll took exactly 1½ hours." Quick, accurate, clean "forgings" without any die cost is another DoAll achievement.

Unmatched Performance

Contour Sawing, the new DoAll process of machining, is recognized as the fastest precision method of removing metal; cuts out internal and external shapes from any metal up to 10" thick.

Does work of 3 machines. DoAll is a moderately priced, rugged precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings.

Used in large and small plants in 30 countries by such firms as Underwood Elliott Fisher, Atwood Vacuum Machine, Taft Pierce, New Monarch Machine, Lectrolite, Federal Cartridge, Waterman Waterbury, Lincoln Engineering, General Instrument, etc.

Let a factory-trained man bring a DoAll to your plant and show you what it does, what is saves on your own work.

FREE New Hand Book on Contour Machining—100 pages of valuable metal working helps.

Continental Machines, Inc.
1310 S. WASHINGTON AVE.
Minneapolis, Minn.

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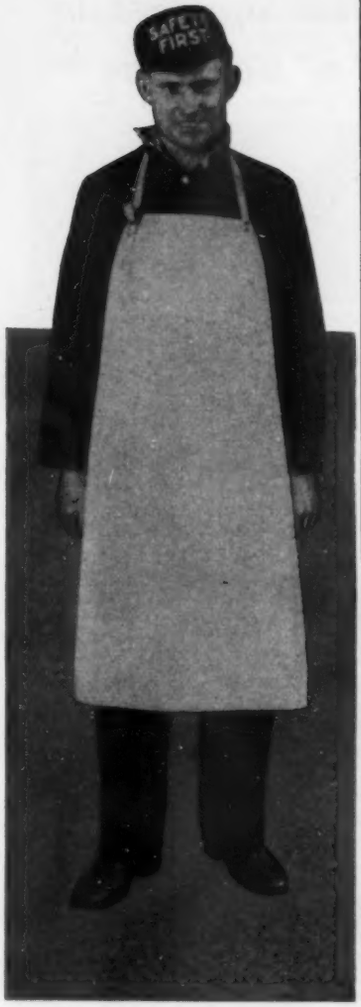
Now AMERICAN SAFETY Aprons

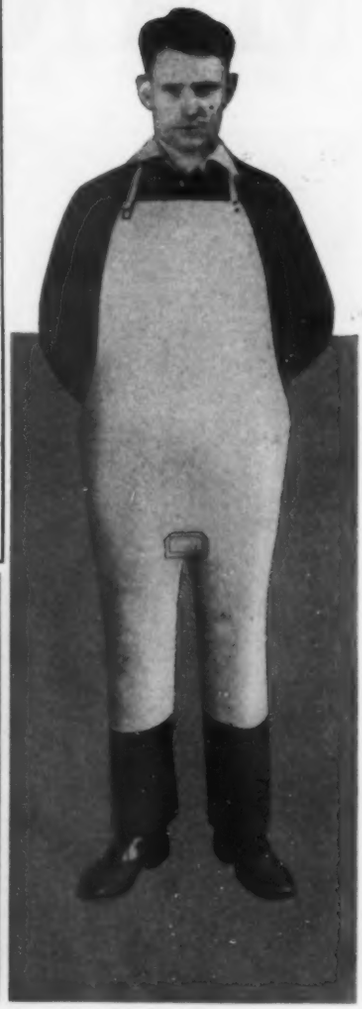
available in a full range of materials and sizes



Full-length apron

Bench apron

Glass cutter's apron



Split-leg apron

Whatever the personal protection requirements of your workers may be, they can now be met promptly and efficiently by American Optical Company's new complete line of safety clothing . . . which includes all equipment from head to ankles.

AO Safety Aprons, for example, are supplied in "Sturdy-Weave" asbestos, chrome tanned leather, acid-proof rubber. A full range of sizes insures correct, comfortable fits for all workers and full protection under all conditions. Materials and workmanship are first quality throughout.

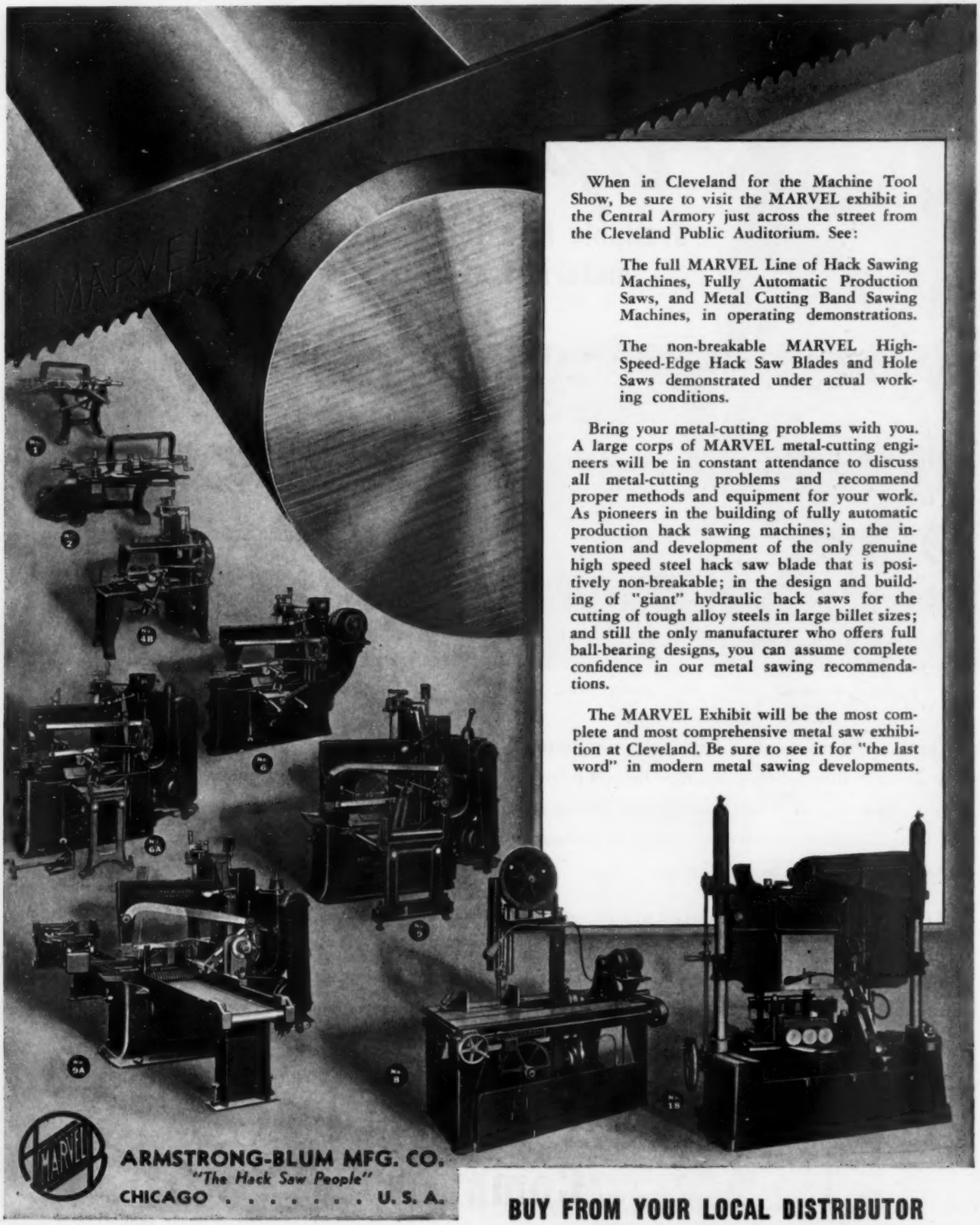
In addition to aprons, our Safety Clothing line includes safety hats, gloves, sleevelets, suits, leggings, spats and mechanical safety devices. All these products are made by American Optical Company, backed by AO services. One of our industrial representatives is always "on call" to study your problems and serve your needs. *Write.*

American Optical Company

FOR OVER 100 YEARS MANUFACTURERS OF PRODUCTS TO AID AND PROTECT VISION. BRANCH OFFICES IN ALL INDUSTRIAL CENTERS

MARVEL SAWS . . .

a complete line and a Complete System of Metal Sawing



When in Cleveland for the Machine Tool Show, be sure to visit the MARVEL exhibit in the Central Armory just across the street from the Cleveland Public Auditorium. See:

The full MARVEL Line of Hack Sawing Machines, Fully Automatic Production Saws, and Metal Cutting Band Sawing Machines, in operating demonstrations.

The non-breakable MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws demonstrated under actual working conditions.

Bring your metal-cutting problems with you. A large corps of MARVEL metal-cutting engineers will be in constant attendance to discuss all metal-cutting problems and recommend proper methods and equipment for your work. As pioneers in the building of fully automatic production hack sawing machines; in the invention and development of the only genuine high speed steel hack saw blade that is positively non-breakable; in the design and building of "giant" hydraulic hack saws for the cutting of tough alloy steels in large billet sizes; and still the only manufacturer who offers full ball-bearing designs, you can assume complete confidence in our metal sawing recommendations.

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"The Hack Saw People"
CHICAGO . . . . . U. S. A.

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Daylight at any hour . . . with

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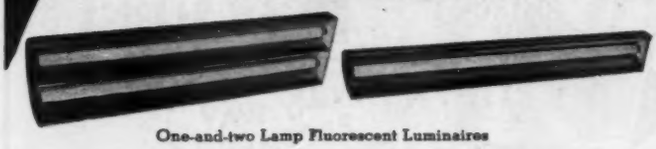

One-and-two Lamp Fluorescent Luminaires

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Here is science's rival to daylight . . . with an extended light source for wide industrial applications. Here is far greater efficiency than any other kind of illumination for interior lighting. Here is low lamp brightness for minimum glare — 3½ candles per square inch from a 1½ inch Fluorescent Tube of 40 watts. Here is a 50 per cent cooler light than any incandescent source . . . and unusually long life.

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Westinghouse Lighting Equipment

"HALLOWELL" STEEL SHOP EQUIPMENT

"Hallowell" Steel Stools

The one piece welded steel construction of "Hallowell" stools and chairs makes them last longer—an important item when you're considering profits.

You can get just what you need in a "Hallowell" for the line is most extensive, with a design adapted for use at any type of operation.

Write us for our catalog.

Fig. 1334
Pat. Applied for

"Hallowell" Steel Tool Stands

Moves easily wherever it's needed; a handy stand to have. Made in a variety of types for all purposes.

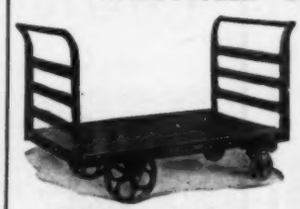
Fig. 705

"HALLOWELL" STEEL WORK-BENCH

Skillfully designed and built for present day needs. Its steel top stays smooth as a surface plate, and steel legs hold it permanently rigid. Bolt holes in the feet make it easy to fasten to the floor and easy to move. All its parts are standard and interchangeable. Best of all the cost is reasonable. Full range of sizes to choose from.

Fig. 732
Pat'd and Pats. Pending
Drawer is extra

"HALLOWELL" STEEL TRUCKS



Made to withstand the toughest treatment. Their steel platform can't splinter —their welded construction assures permanently rigid joints. And, because the wheels have smooth bores or anti-friction bushings in hubs and casters, and are perfectly lubricated, they're much easier to handle. Write for Bulletin.

Fig. 754 Pat. Applied For

"HALLOWELL" FOREMAN'S DESK

Ideal for foreman's use. Right height . . . right incline to write on while standing. Large drawer with lock for holding valuable papers. Carried in stock for prompt deliveries.

Fig. 981 Pat. Pending

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Barnes Field Men are trouble shooters. They know what hack saw blades and band saws are intended to do. To help you out of a hole, they'll hop onto the job as quickly as a fireman on a five-alarm blaze.

So if you have a metal cutting problem, write Barnes at Detroit or call up your regular distributor. Either can make the connection between your problem and the right answer.

Ask your dealer for Barnes Blades.

W. O. BARNES CO. INC.
DETROIT MICHIGAN

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming . . . . .

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

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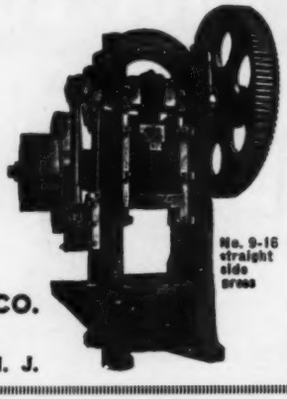
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ZEH & HAHNEMANN CO.
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New 1/10,000" Indicator
Model C-10

Range	.5"
Diameter of case	1 15/16"
Diameter over all	2¼"
Depth of case	¾"
Length over all	3¼"
Lug or Bracket—Offset, on center if desired	Hole 3/16"
Back held in position by	4 large screws
Center of spindle to center of hole in lug	15/16"
Weight	5 ounces
Stem	9/32 diam.
Dial	0-5-0 or 0-10
Graduated	.0001
Crystal	Non-breakable

Model C-10

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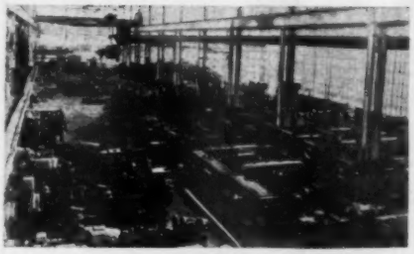

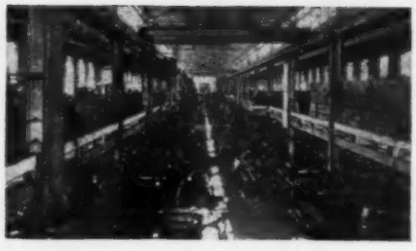

Searchlight Section
AMERICAN MACHINIST

MACHINE TOOL SHOW IN PRINT NUMBER

September 20, 1939

USED MACHINE TOOLS

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Re-MANUFACTURED MACHINE TOOLS
(RECONDITIONED BY US)

IMMEDIATE DELIVERY!

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No. 21 Lucas, 2½" bar
No. 1 Cleveland, 2½" bar (2)
No. 3-A Universal, 3" bar (2)
No. 2 Rochester, 3" bar
No. 3½ Universal, 3½" bar
No. 2 Lucas, 3¾" bar (2)
4½" bar Hamilton Fl. Type
5" bar N.-B.-Pond, Fl. Type

BORING MILLS

24" Bullard "New Era"
30" King (2)
36" Bullard "New Era" (2)
42" Gisholt, motor drive
48" Colburn (2)
52" King
54" Colburn
60" Colburn (2)
62" King
72" King, M.D. (2)
72" Niles, M.D. (2)
96" Cincinnati, motor drive
10' Niles

DRILLS—Ball Bearing

No. 1—1-spdl. Leland-Gifford
No. 2—1-spdl. Leland-Gifford (4)
1-spdl. Henry & Wright (2)
No. 3—1-spdl. Avey
No. 2—2-spdl. Leland-Gifford (3)
2-spdl. Henry & Wright (4)
3-spdl. Henry & Wright
No. 2—3-spdl. Leland-Gifford P.F.
No. 2—4-spdl. Leland-Gifford (6)
4-spdl. Henry & Wright (2)
8-spdl. Henry & Wright

DRILLS—Manufacturing

No. 12—1-spdl. Colburn
No. 2—24" Defiance
No. D-2 Colburn, 1-spdl.
No. D-4 Colburn, 1-spdl.
No. 314 Baker, 1-spdl.
No. 3—24" Defiance
No. 25—36" Foote-Burt
No. 416 Baker, 1-spdl.
No. 4—2-spdl. Colburn
24"—2-spdl. Foote-Burt
No. 2—3-spindle Colburn
No. 2—4-spdl. Colburn
No. 4—5-spdl. Foote-Burt
No. 66-D—16-spdl. Moline Hole Hog

DRILLS—Multiple

Boley 6, 8, 10-spdl. (4)
No. 1 Baush 8, 16-spdl.
No. 14 Natco 12, 16-spdl.
No. 3 Baush 24, 36-spdl.
No. 4 Baush 16-spdl.

DRILLS—Radial

3' Western (3)
3' American Triple Purpose
4' Western (2)
5' American
5' Cincinnati-Bickford
6' Western (2)
6' American
6' Reed-Prentice

GEAR CUTTERS

No. 2, No. 3 Barber-Colman
No. ½ Pfauter, M.D. (2)
No. 18-H Gould & Eberhardt
No. 16-HS Gould & Eberhardt
No. 3—26" Brown & Sharpe (2)
No. 1 Schuchardt & Schutte
No. 2—36" Pfauter
No. 4—48" Brown & Sharpe
No. 3—52" Pfauter
No. 2—60" Goss
No. 6 Fellows (2)
No. 61 Fellows
No. 615 Fellows
No. 62 Fellows
No. 624 Fellows
No. 645 Fellows
36-8M Gould & Eberhardt
96" Newton

GRINDERS—Plain and Universal

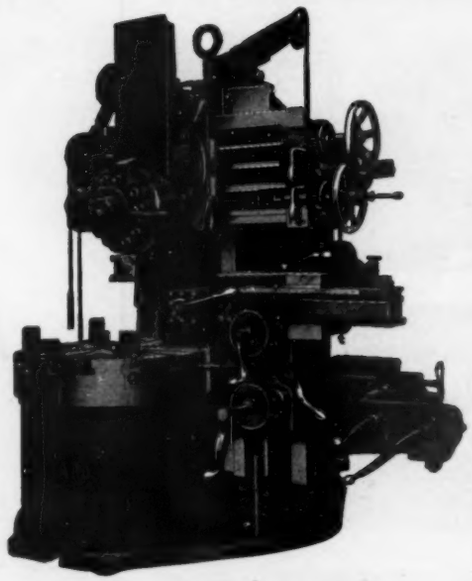
6x32 Norton, motor drive
8x18 Cincinnati, M.D. (3)
8"x36" Cincinnati, M.D.
No. 12—8"x36" Brown & Sharpe
10"x18" Norton, motor drive
10"x24" Norton, motor drive
10"x36" Norton, motor drive
10"x50" Norton, motor drive
10"x72" Norton, motor drive
10"x96" Norton, motor drive
14"x36" Norton, motor drive
14"x50" Norton, motor drive
14"x72" Norton, motor drive
14"x96" Norton, motor drive
16"x50" Norton, motor drive
16"x72" Norton, motor drive
18"x96" Norton, motor drive
21"x96" Norton, motor drive
23"x120" Norton, motor drive
20"x168" Landis
26"x96" Landis
No. 2½ Universal (Bath Type)
No. 2—12"x30" Brown & Sharpe Univ.
No. 4—12"x66" Landis Univ.
No. 4-A—16"x66" Landis Univ.

GRINDERS—Miscellaneous

No. 70 Heald Int. (3)
No. 2 Reid Surface
No. 22—12" Heald Rotary Surface
No. 16 Blanchard Vert. Surf., M.D.
No. 16-A Blanchard Auto. Surf.
No. 10 Lees-Bradner Gear Grdr. (2)
No. 3 Barber-Colman Hob Grdr.

LATHES

4"x36" Lo-Swing M.D. (7)
No. 12 LeBlond Multi-Cut
16"x6' Lodge & Shipley
16"x9' Chard
16"x8' Lodge & Shipley (2)
16"x12' Lodge & Shipley Grd. Hd.
18"x8' Lodge & Shipley Grd. Hd.
18"x9' Lehmann Grd. Hd.
18"x12' American Grd. Hd.
19"–38" Gap x 10' LeBlond
20"x12' Mueller
22"x12' Lodge & Shipley Grd. Hd.
24"x14' American (2)
24"x14' American Grd. Hd.
24"x14' Lodge & Shipley Grd. Hd.
24"x16' Lodge & Shipley Grd. Hd. (2)
24"x18' American Grd. Hd.
24"x22' Lodge & Shipley, taper
27"x18' Sidney, taper
27"x12' American Grd. Hd.
30"x11' American, Grd. Hd.
30"x12' Whitcomb-Blaisdell
36"x12' Lodge & Shipley Grd. Hd.
36"x14' Lodge & Shipley Grd. Hd.
42"x34' Putnam Grd. Hd.
66"x21' Putnam M.D.



Bullard "New Era" Vertical Turret Lathe

MILLING MACHINES

No. 2-B Milwaukee
No. 3 Cincinnati High Power (4)
No. 3-B Milwaukee (2)
No. 3-B Brown & Sharpe (3)
No. 4-B Brown & Sharpe (3)
No. 4 Kempsmith Maxi-Mill, M.D.
No. 4 Cincinnati High Power
No. 3-B Milwaukee Univ.
No. 3 Cincinnati Univ.
No. 3 Milwaukee Vert.
No. 3 Cincinnati Vert.
No. 4 Cincinnati Vert.
No. 5-C Brown & Sharpe Vert.
No. 6 Becker Vertical (3)
No. 31 DeVlieg Mfg. (2)
24" Cincinnati Mfg. (2)
18" Cincinnati Duplex (2)
24" Cincinnati Duplex
No. 5—48" Cincinnati Hydro. (2)
24"x24"x12' Ingersoll Slab
24"x20' Ingersoll Slab
36"x36"x12' Newton Duplex
38"x44"x20' Ingersoll Slab
6"x14" Pratt & Whitney Thread
6"x48" Pratt & Whitney Thread (2)
Hanson-Whitney Thread
No. 4 Lees-Bradner Thread

PLANERS

24"x24"x6' Rockford
24"x24"x8' Cincinnati
24"x24"x12' Gray
30"x30"x8' American
30"x30"x14' Gray
30"x30"x18' Cincinnati
36"x36"x8' Cincinnati
36"x36"x12' Gray Max. Service
44"x36"x12' Gray
36"x36"x16' Niles-B.-Pond
36"x36"x18' Cincinnati, M.D. (2)
36"x36"x14'-24' Cleveland O.S.
36"x36"x24' Gray
42"x42"x30' N.-B.-P.
48"x36"x10' Cincinnati
48"x48"x10' N.-B.-P.
48"x48"x10' Detrick & Harvey O.S.
48"x48"x16' N.-B.-P.
60"x48"x20' Hamilton
72"x48"x10' Cincinnati
72"x60"x16' American
72"x72"x16' Cincinnati, M.D.

PRESSES

No. 01 V.&O., O.B.I. (2)
No. 1 V.&O., O.B.I. (3)
No. 1½ V.&O., O.B.I. (2)
No. 20 Bliss, O.B.I. (2)
No. 3 V.&O., O.B.I.
No. CG-24 Ferracute O.B.I.
No. 5 V.&O., O.B.I.
No. 303 Bliss S.S. (2)

SHAPERS

24" Gould & Eberhardt (2)
32" American (Late Type)

AUTOMATICS

No. 2-G Brown & Sharpe (2)
1¾" Model "C" National-Acme
3¼" Gridley Single Spdl.
4¼" Gridley Single Spdl. (2)
4¼" Cleveland

TURRET MACHINES

No. 2—1" Warner & Swasey
No. 4—1½" Warner & Swasey Univ. (2)
No. 4 Gisholt Univ. Tim. Brg.
No. 5 Foster Universal Tim. Brg.
No. 6 Warner & Swasey (2)
No. 8 Warner & Swasey
No. 1-B Foster Universal (2)
No. 2-B Foster Universal Tim. Brg.
No. 2-A Warner & Swasey (2)
No. 3-A Warner & Swasey (3)
No. 3-B Foster Universal
3¼"x36" Cincinnati-Acme
26" Libby 7½" H.S.

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LOW COST

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PRECISION

True alignment of spindle — Wheel slide — and table — together with accurate fitting of component parts insures precision limits of accuracy.

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Elimination of all gears in work head—results in extremely fine surface finish—

Measured in MICRO-INCHES (MILLIONTHS OF AN INCH)

Use only 2 constant speed motors

Immediate shipment!

Guaranteed New Machine Performance!

6x32	10x18	10x50	14x36	16x50	18x96	21x96	23x120
	10x24	10x72	14x50	16x72			
	10x36	10x96	14x72				

Gap Machines: 10-15x24, 10-15x72, 18-24x96

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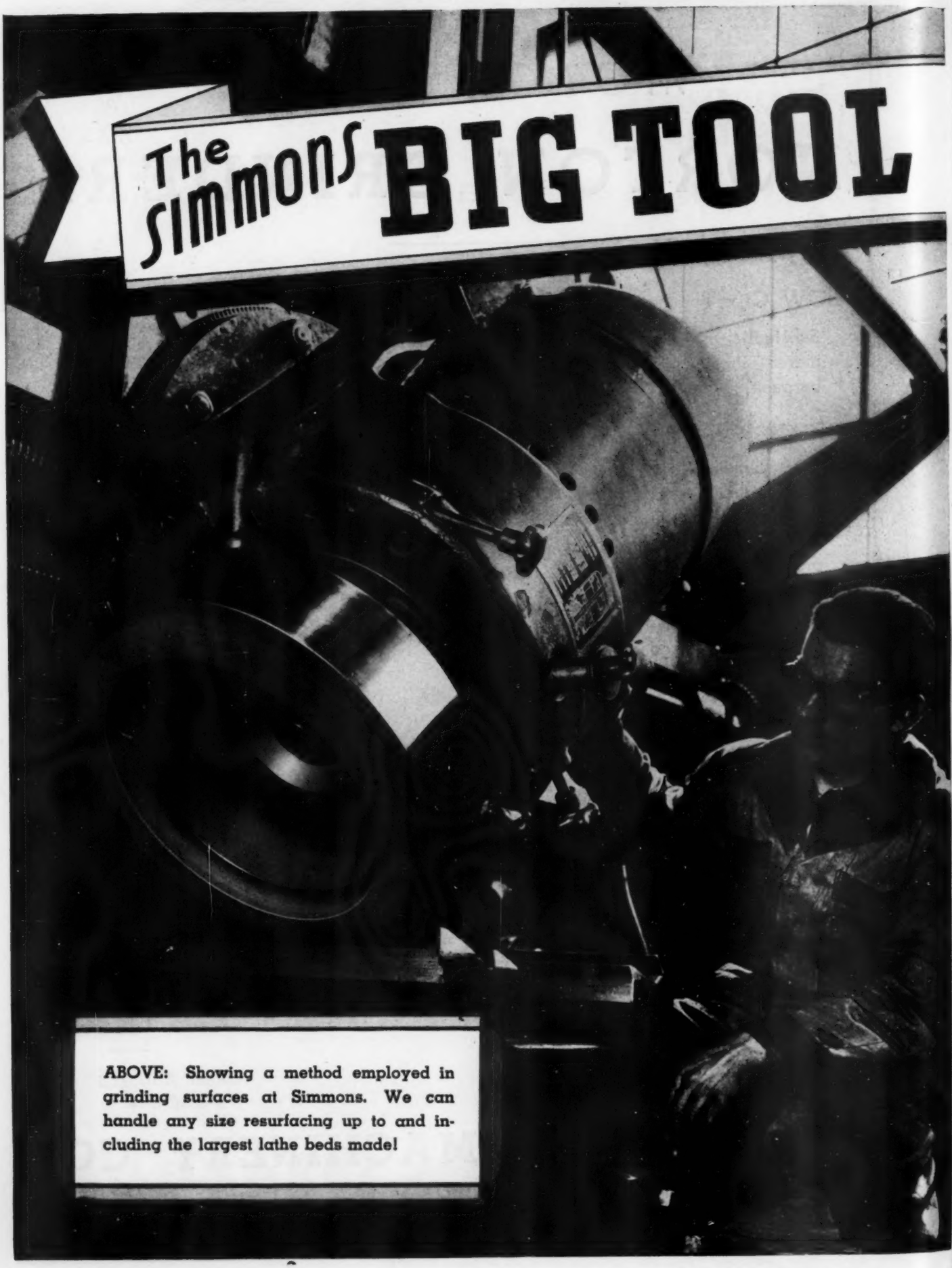
CHICAGO

The Simmons BIG TOOL



ABOVE: Showing a method employed in grinding surfaces at Simmons. We can handle any size resurfacing up to and including the largest lathe beds made!

SHOW at SIMMONS ALBANY PLANT ALL YEAR AROUND!

Do You Demand Precision Workmanship?

You get it in SIMMONS rebuilt machine tools! During our 28 years' leadership in this field, we have equipped ourselves with every modern method for assuring the highest quality and most accurate workmanship available in rebuilt machinery.

Do You Have Special Requirements?

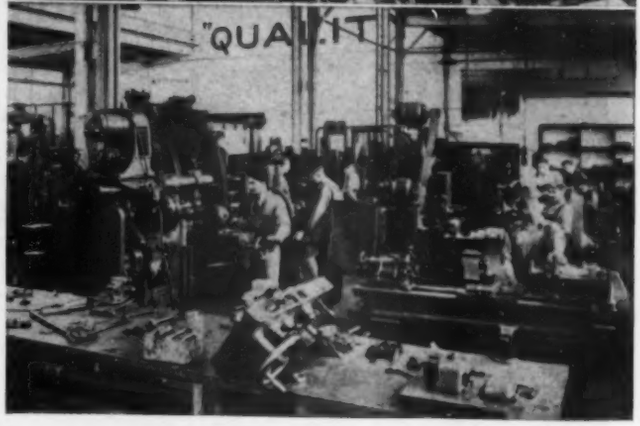
You can find exactly the type of equipment you need in our tremendous stock! A wide choice includes nearly every conceivable type of machine from the smallest to the largest.

Do You Demand Immediate Delivery?

Right NOW there is an abnormal demand for all machinery. Prices are soaring! Deliveries are held up! From our huge stock, you can get guaranteed "rebuilt" machines at great savings in prices . . . and almost *immediate delivery.*

ACT NOW!

Come to Simmons *first!* Our stock is turning over so fast that any list we published would be out of date by the time it reaches you. Write! Phone! Better yet—come and make a personal inspection—while the choice and values are greatest!



TOP ILLUSTRATION

The largest grinder ever rebuilt in America being run under power in the SIMMONS REBUILDING PLANT for customer's inspection.

CENTER ILLUSTRATION

A corner of the SIMMONS machine shop in which various operations incident to rebuilding are being handled.

BOTTOM ILLUSTRATION

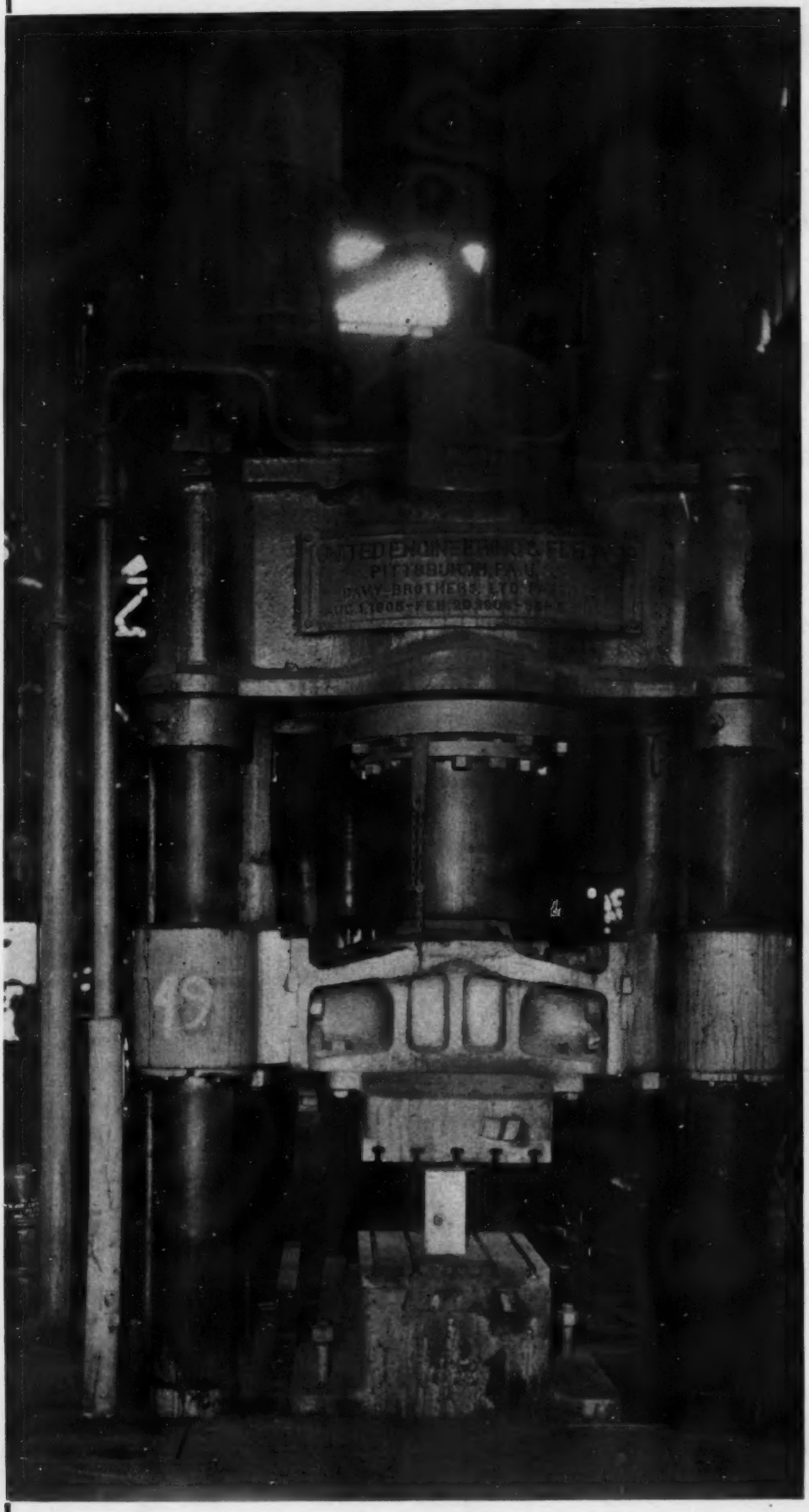
"QUALITY" work is a by-word in the SIMMONS REBUILDING PLANT, and applies to the gear-cutting department pictured here as to every department in the entire shop. SIMMONS produces 100 per cent of the gears required for replacement in machine rebuilding.

SIMMONS

MACHINE TOOL CORPORATION

Albany, New York

EXPORT OFFICE....149 BROADWAY, N. Y. C.
CABLE ADDRESS.....SIMMONS, ALBANY



It's on

ALL of this

Actual Picture of

1500-ton Like New High-speed Forging Press

Single Lever Control

United Engineering & Foundry Company

with Steam Intensifier Storage, Air and Water Tanks

You are paying too high a price for NEW Machinery—if you don't first investigate the "above the average" machines on our last lists.

"The Used Machinery House Known Everywhere"

BIG Equipment—

that **YOU SAVE** the **REAL** big money — and for TWO Reasons —
BIG MACHINERY must always be sold while set on original foundations —
BIG MACHINERY is mighty expensive for a dealer to handle, if moved into outside storage.

BIG MACHINERY is still set up in the plants where used
and now selling DIRECT from the shops where used —

the sensible and cheapest way to buy used machinery

***Showing*—The LARGEST USED VERTICAL BORING & TURNING MILL** on the Used Machinery Market — 18-24 ft. swing — 2 heads.
"Wm. Sellers & Co."

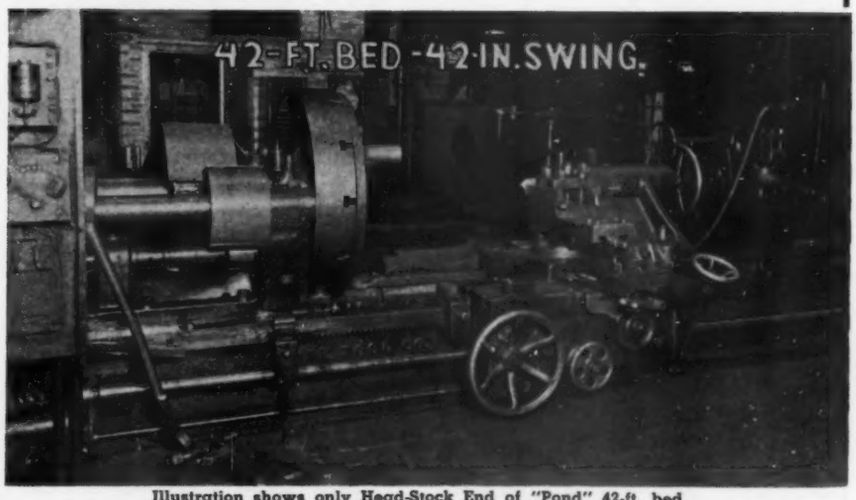
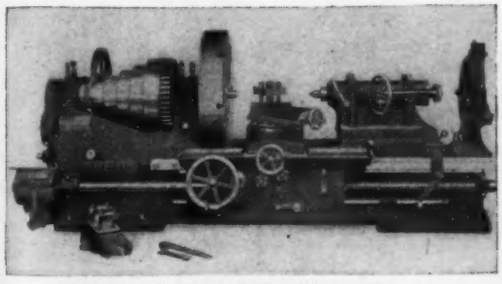
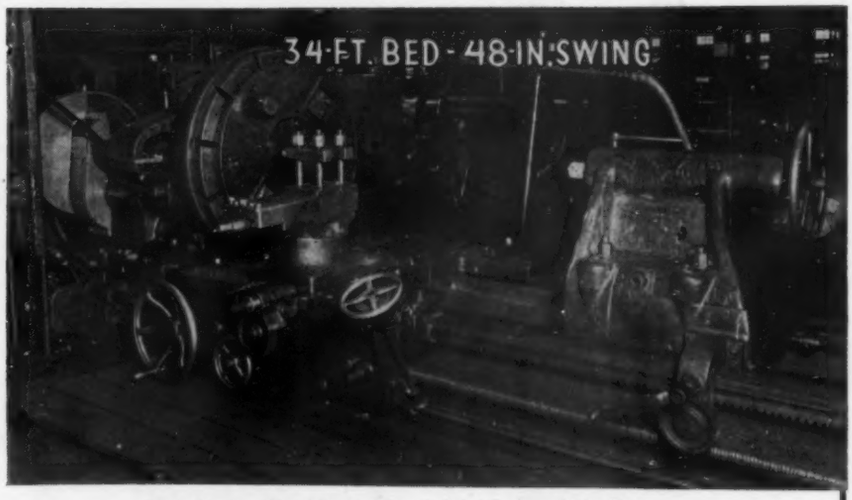


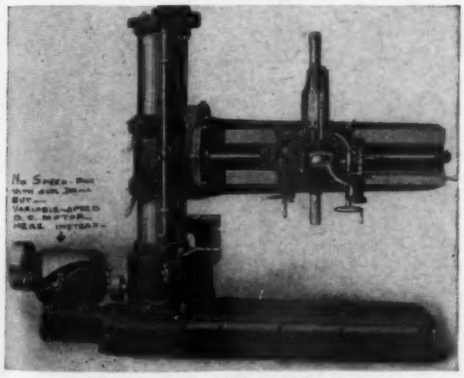
Illustration shows only Head-Stock End of "Pond" 42-ft. bed Triple-geared Lathe—42-in. swing—Motor-driven



"Lodge & Shipley" Lathe—42-in. swing—20-ft. bed



Also showing Head-Stock End of 48-in. Swing—34-ft. Bed—"Niles-Bement-Pond" Triple-geared Lathe—Motor-driven



"American Tool Works" 7-ft. arm Full Universal Radial Drill

"The Used Machinery House Known Everywhere"

McCABE & SHEERAN MACHINERY CORPORATION

(REG. U. S. PATENT OFFICE)

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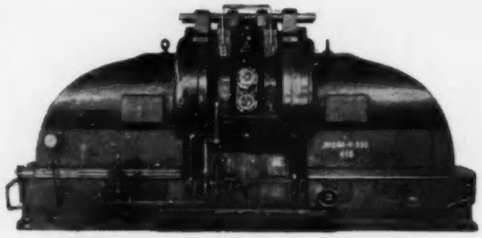
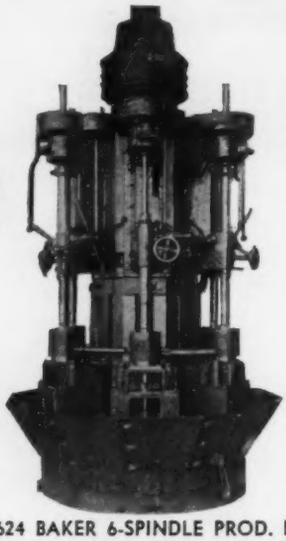
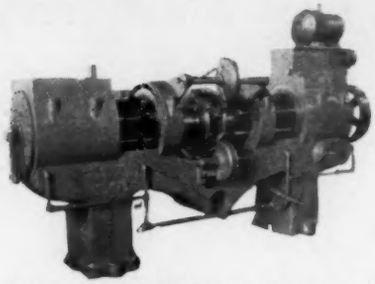
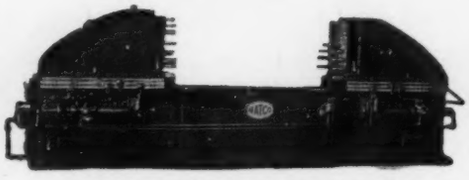


No. 450 W. F. & J. BARNES DRILLING AND TAPPING MACHINE



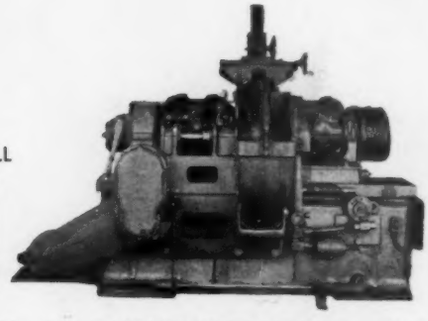


DAVIS & THOMPSON "ROTOMATIC" DOUBLE-END DRILLS



NATCO HORIZ. HYD. DOUBLE END MULTIPLE DRILL

No. 624 BAKER 6-SPINDLE PROD. DRILL

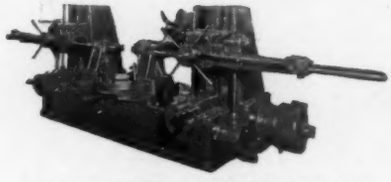


No. 84A GARDNER PROD. OPPOSED HEAD GRINDER

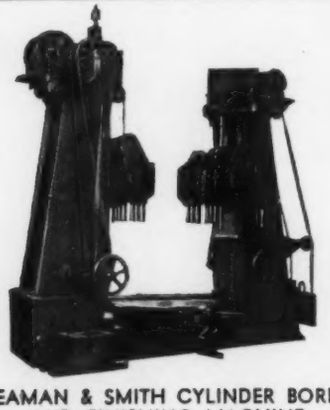
ARE YOU IN NEED OF A **SPECIAL TOOL** FOR SOME SPECIAL WORK

Illustrated are a few of the many machines we have that can be adapted to your needs with a few minor changes or may be used as they are at present. Our low price on these and others will justify their purchase.

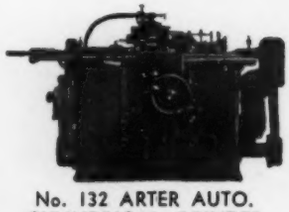
FITCHBURG SEMI-AUTO. SPLINE GRINDER



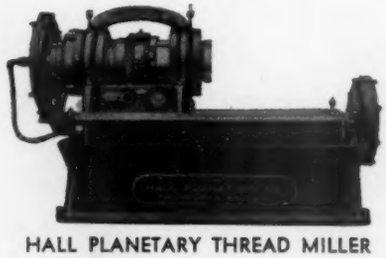
CLEVELAND 3-WAY HORIZONTAL BORING MILL



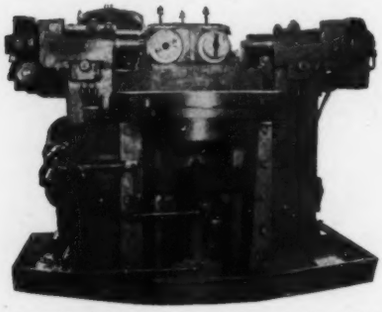
BEAMAN & SMITH CYLINDER BORER AND FINISHING MACHINE



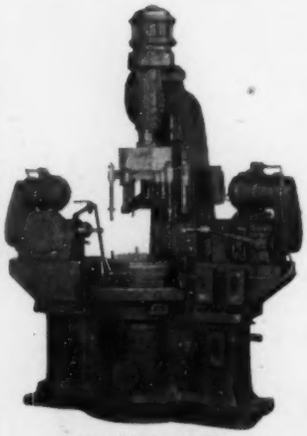
No. 132 ARTER AUTO. CYLINDRICAL GRINDER



HALL PLANETARY THREAD MILLER



4-SPINDLE NEWTON RISE & FALL MILL



BRADFORD 3-HEAD SEMI-AUTO. DRILL

No. 45 PRODUCTO-MATIC MILL

WRITE US FOR PHOTOS AND FULL DESCRIPTION

Ask for a Copy of Our No. 39 Handy Pocket Reference!

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BORING MILLS—Vertical

BULLARD 24", 36", 42" New Era
BULLARD 8" Mult-au-Matic
GISHOLT 42", 2 heads
N.B.P. 72", 2 heads
BULLARD 72", 2 heads
BETTS 6'—10' extension type
NILES 10'—2 heads
NILES 10'—16' 2 heads

PLANERS

CLEVELAND 48"x48"x16' Openside, 3 heads
AMERICAN 36"x36"x20', 4 heads
GRAY 42"x42"x10', 2 heads
WOODWARD & POWELL 60"x42"x19', 4 heads
CLEVELAND No. 1 plate—21' cap.

GRINDERS

HEALD No. 70, 72 Internal
BROWN & SHARPE No. 10, 11, 14
CINCINNATI 8x18", 12x36" Plain
LANDIS 6x20", 10x24", 10x36" Hyd.
LANDIS 6x18, 10x24, 10x36, 10x52"
NORTON 10x36", 10x72" Plain
B. & S. Nos. 1, 2, 3, 4 Universal
NORTON Type L—12x36 Universal
BLANCHARD No. 16 Surface M. D.
DIAMOND No. 3 Surface
HEALD Nos. 20, 22, 255, 260 Surface
HEALD Nos 25, 25A Surface, Hyd.
PRATT & WHITNEY 14" Surface

MILLING MACHINES—Universal

B. & S. No. 2A, No. 3A, No. 4A; SPD
CINCINNATI No. 2, 3; cone
ROCKFORD No. 2, cone
KEMPSMITH No. 1, 2, 3; cone
OHIO No. 25, No. 35

LATHES

AMERICAN 16"x8' geared head
L. & SHIPLEY 16"x8' geared head
HENDEY 18"x8', 20"x10'
PRENTICE 20"x11' geared head
LODGE & SHIPLEY 24"x22' cone
REED PRENTICE 24"x18', 24"x20'
PITTSBURGH 36"x38' geared head
PUTNAM 36"x28' geared head
BRIDGEFORD 36"x20' geared head

BORING MILLS
HORIZONTAL
Floor Type

N. B. P. 6½", 6", 5" bar
LANDIS No. 35, 3½" bar

Table Type

LUCAS 4" bar
UNIVERSAL 3½" bar
G. & L. 3⅛" bar
CLEVELAND 2½" bar

SCREW MACHINES—Automatic

BROWN & SHARPE No. 00G, 0G, 2G
BROWN & SHARPE No. 4 automatic
ACME MODEL "C," 1⅝" cap. 5 spindle

TURRET LATHES

FOSTER No. 1B, 2B
GISHOLT No. IL, 3L
W. & S. No. 1A, 2A, 3A
WARNER & SWASEY No. 4 Univ.
JONES & LAMSON 2¼x24", 3x36"
BROWN & SHARPE No. 6, 6F
GISHOLT No. 2, 3

GEAR HOBBERS

BARBER COLMAN No. 2, 3, 12
G. & E. 18, 18H, 36H
CLEVELAND 8 spindle Spline

GEAR CUTTERS

BROWN & SHARPE No. 3, 4, 5
FELLOWS No. 6, 61, 615
FELLOWS No. 7, 7A, 70
LEES BRADNER No. 5A
GLEASON 6", 11", 18" Double tool
GLEASON 15" Finisher & Rougher
GLEASON 24", 36", Bevel Gear

MILLING MACHINES—Plain

K. & T. No. 3B, 4B, motor-in-base, dble. overarm
B. & S. No. 3B, 4B? mo. dr. late type
CINCINNATI No. 3, 4, 5
LeBLOND No. 4 cone drive
LeBLOND No. 4G, single pulley
— 20 other cone pulley No. 1, 2, 3, machines

MILLING MACHINES—Misc.

INGERSOLL—24"x24"x12'; 24"x36"x12'; 3 hds; adj. rail
BEAMAN & SMITH 30"x30"x8'; adj.
LEES BRADNER No. 8 Thread
BROWN & SHARPE No. 5 vertical
BECKER No. 4B Vertical

MISCELLANEOUS

ACME 1" Upsetter
LANDIS 4" single head Bolt Cutter
LANDIS 6" Pipe Machine
TREADWELL 12" Pipe Machine
AMERICAN 6' Univ. Radial Drill
QUICKWORK No. 60 Shear
ERIE 800 # double frame steam hammers

The above is only a PARTIAL LIST

Your Inquiries Solicited

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MOREY MACHINERY CO., INC
410 BROOME ST., NEW YORK

at FALK'S ...a PERMANENT SHOW of HIGHER EFFICIENCY LOW COST *USED and REBUILT EQUIPMENT!*

Automatics

Brown & Sharpe 6—#00; 2—#0; 2—#2
2—Cleveland Md. A, 1½", M.D.
2—Gridley 1¼", model G, ⅞ Model F.
1—Acme, 4 spindle; ⅞"
1—Fay 14"x19"

Boring Mills

24" Bullard Rapid Prod. M.D.
24" Bullard Rapid Prod. S.P.D.
36" Bullard New Era #9471, M.D.
60" N.B.P.Vert.2-hds; belted M.D.
Colburn Horiz. Diamond; M. D. Hydraulic Feed

Drills

Colburn #2, Single Spindle
Colburn #2, 2-spdle
Aveymatic 2, 3, 4 spindle, #2 & #3
Leland Gifford 2—3 spindle
Henry & Wright, 1, 2, 3, 4 spindle
Allen 1 & 2 spdle #2 M.T.
Sipp 1, 2, 3, 4 spindle, #2 M.T.
Fosdick Radials, 2½", 3"
N.B.P. 6' Universal Radial
N.B.P. 4' Semi-Universal Radial

Gear Cutters & Hobbers

Whiton 24" Universal
Adams-Farwell 12"
Gould & Eberhardt 48"
Barber Colman #12, #3, #2
Schuchart & Schutte, 14"

Grinders

#2 Cincinnati Centerless
#3 Landis Universal
#1 B&S Universal
10x72 Norton, M.D. Like new
12x36 Norton Model A, Plain
14x50 Norton Model A, Plain
#2 Cincinnati, 12x36, Plain
8x20 Fitchburg
#3 & #33 Abrasive Surface
#2 B&S Surface (2)
#70 Heald, Internal (2)
#22 B&S, Internal
All other types and sizes of Grinders in stock.

Presses

15—#18 Bliss 2—#21½ Bliss
15—#1 V & O 8—#21 Bliss
20—#2½ V & O 5—#20 Bliss
8—#5 V & O 6—#20B Bliss
#2½ Bliss Gap Press
#306 Bliss, S.S.
#37½ Bliss, S.S.
#36 Niagara
#79½ Bliss, S.S. Gre. Tierod
#3 & #4 Bliss Geared, Back Flywheel
#P-3 Ferracute
#103-S Bliss Auto. Gang
#75 Toledo, Geared
#6 Toledo, Geared
#6 Niagara Geared

SPECIALS

#2 **Cincinnati Centerless Grinder**; with Oscillating Spindle; In-feed and Thru-feed Attachments; extra Wheel Mounts; Wheels; and Electrical Equipment. Perfect condition.

#79½ **Bliss** (new #312) Grd. **Press**; Tie-rod. 18" stroke; bed 43x41"

#306 **Bliss** S.S. Tie-rod, 6" stroke

73-10' **Chicago Power Box & Pan Brake**; 10' long 10 gauge cap. Motor Drive.

Lathes

6—American, from 14x6—16x6 16x8—18x8—20x8—22x8
6—Hendey, from 12x5—14x6 14x8—16x6—14x10
7—LODGE & SHIPLEY, from 14x6—16x6—18x8
2—Pratt & Whitney, 13x6 Model B—16x6
4—Monarch, 14x6 — 16x6 — 18x6—20x10
2—LeBlond—14x8—25x12
1—Greaves-Klusman, 24 x 12, Taper
2—Bridgeford, 26 x 14 Geared Head, Taper, M.D.
1—Boye & Emmes, 32x14, Taper
1—Putnam 60"x26', with Roll Grinding Att.

Millers

Universal

#1-B Milwaukee, S.P.D.
#1½ LeBlond, Heavy Duty (2)
#1½ Cincinnati
#1-M Cincinnati, S.P.D.
#2 Kempsmith (2)
#2 Van Norman (3)
#½ Van Norman
#2-A Garvin
#4 Cincinnati

Plain

Brown & Sharpe #1-Y; #1½-B Heavy; #2-B Heavy
Cincinnati #1½; #2; #3
Kempsmith #1; #2; #3
Ohio #3
Rockford #1B
Bilton #25 (2)

Vertical

Brown & Sharpe #3
Becker #5C; #5B; #6

Shapers

G & E 14, 16, 18, 20, 24"
Cincinnati 16, 20, 24"
Smith & Mills, 14, 16, 20, 24, 26"
Wolcott, 20"
Southbridge 16, 20, 24"

Planers

36x36x12' Beckett, 4-heads
30x30x8' Whitcomb, 2-heads
24x24x84 Wilson, 1-head

Motors-Generators-Transformers

An exceptional large stock—Bargains

Miscellaneous

Power Shears — NIAGARA, ROBINSON, TOLEDO, OHL 10'x3/16; 6'x¼"; 10'x14 ga.; 5'x14 Ga. 3'x14 ga.
ACME 40" Paper Cutter, Power.
Steel Power Bending Brake, 10'x10 ga.
10" Persons-Arter Surface Grinder
Spot Welders—90-KW; 60-KW; 48-KW; 30-KW; 25-KW; 15-KW; 10-KW
Bending Rolls, ALL SIZES
Sleeper & Hartley Bx Coiling Machines (2)

Many other Bargains in Stock! Tell us what you want!
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You can get the tools you need NOW at substantial savings. Phone, wire or write for details.

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868', 17"x10"x12" CHICAGO
706', 17"x9¾"x12" SULLIVAN
620', 14"x8¾"x10" SULLIVAN
610', 15"x9¼"x12" INGERSOLL RAND
550', NATIONAL 3 cylinder vert.
355', 12"x10" INGERSOLL RAND
265', 9½"x10" WORTHINGTON
136', 8"x8" INGERSOLL RAND
67', 6"x6" CHICAGO
49', 6"x6" CURTIS vertical

AUTOMATICS
⅜", No. 19 BROWN & SHARPE
⅞"-1¼" CLEVELAND Model A
1" CLEVELAND "J" double end
1¼" & 2" CLEVELAND Model B
1¼" & 1½" CONE 4-spindle
1½" CLEVELAND "M" 4 spindle
1⅝" NEW BRITAIN 6 spindle
1¾" GRIDLEY "F" 4 spindle
2" CLEVELAND Model A
2" NATIONAL ACME Model B
2¼" No. 56 NATIONAL ACME
3¼" GRIDLEY single spindle
Nos. 454, 654, 24, 33 & 34 NEW BRITAIN chucking
Nos. 4A & 5A POTTER & JOHNSTON
8" & 12" BULLARD Multaumatic
10" BULLARD Continumatic
18" GISHOLT Simplimatic
14" FAY chucking

BORING MILLS
3" No. 5 DEFIANCE
3" BINSEE, knee type
3½" No. 0 GIDDINGS & LEWIS
3¾" No. 5A DEFIANCE
4" D. & H. floor type
24" BULLARD with side head
34" COLBURN single turret
36" NILES car wheel
42" KING
42" DETRICK & HARVEY
51" BULLARD
60" GISHOLT

DIAMOND BORERS
2-spdl. COULTER vertical
W. F. & JOHN BARNES horizontal

DRILLS
21", 24" & 28" CINCINNATI
24" BARNES all geared
21", 24", 28" SUPERIOR
24" AURORA
30" SNYDER
No. 121, 217, 314, 315, 321 BAKER
No. 2 MFG. COLBURN 1, 2, 3, 4 spdl.
NATCO multiple Nos. 11, 12, C12, 13, C13, 14, B14 & 30
No. 1 BAUSH multiple
No. 1 PRATT & WHITNEY gun
6 spdl. PRATT & WHITNEY deep hole
Nos. 6D, 11D & 16D MOLINE
No. 10D MOLINE cylinder boring
5 spdl DETROIT automatic
No. 15½ & 17 FOOTE BURT
2½' MORRIS radial
3' AMERICAN sensitive radial
3' DRESES radial
3' CINT. BICKFORD radial
3½', 4', 5' and 6' WESTERN radial
4' MUELLER radial
4' HAMMOND radial
5' AMERICAN triple purpose radial
6' N.B.P. univ. radial
Sensitive: All makes and sizes

FORGING TOOLS
Nos. 25, 8 & 9 WILLIAMS & WHITE bulldozers
No. 3B & 5-1 NAZEL hammers
No. 1A AJAX forge rolls
1", 1½", 2" & 4" AJAX upsetters
1½" ACME upsetter
½" No. 3 W. F. cold header

GEAR CUTTERS
Nos. 3 & 12 BARBER COLMAN
Nos. 12HS, 18H & 36H GOULD & EBERHARDT hobbers
Nos. 1 Mfg. & 5A LEES BRADNER
28" G. & E. spur & bevel
36"x10" NEWARK automatic
Nos. 3 & 4 B&S auto.
GLEASON quenching press
No. 6 & 77A FELLOWS
FELLOWS hourglass generator
No. 2 & 2½ BILTON auto.
GLEASON bevel tester
INGLE tooth rounder
G & E cutter grinder
FELLOWS cutter & gear checker
NATIONAL CLEVELAND cutter & gear checker
No. 10 LEES BRADNER gear grinder

GRINDERS
No. 2 CINCINNATI centerless
Nos. 72 & 72A3 HEALD internal
No. 12 BRANT internal
No. 3 BARBER COLMAN hob
16"x32" NORTON crank
16"x48" LANDIS crank
No. 4 BROWN & SHARPE univ.
Nos. 1, 2 & 2½ BATH universal
No. 16 BLANCHARD surface
6"x18" No. 2 B & S surface
6"x36" NORTON surface
7"x45" BATH surface
8"x36" MANHATTAN surface
14" PRATT & WHITNEY BB surface
14"x48" No. 4 ABRASIVE surf.
16"x48" DIAMOND surface
20"x50" SAFETY EMERY surf.
30"x84" DIAMOND face
18", 24" & 30" GARDNER disc
Nos. 8 & 22½ BADGER disc
24", No. 84 GARDNER opp. disc
8" ARTER auto. piston ring
LANDIS:—6"x18" to 16"x53"
NORTON:—6"x32" to 14"x72"
MODERN 12"x24"
CINCINNATI:—12"x36" & 12"x48" univ.
No. 184 GREENFIELD cutter
WOODS tool & cutter
NATIONAL TOOL worm
PRATT & WHITNEY worm
No. 524 MUMMERT DIXON swing
GISHOLT tool grinder
24" INGERSOLL tub
No. 60 HEALD cylinder
No. 20 BATH spline

JIG BORERS
No. 2 PRATT & WHITNEY

KEYSEATERS
¾", No. 0 MITTS & MERRILL
1¼", No. 2 MITTS & MERRILL

ENGINE LATHES
10"x5' PRATT & WHITNEY
12"x6' MONARCH
13"x6' WILLARD
14"x6' MONARCH
16"x6' MONARCH
16"x6' CISCO geared head
16"x6' HENDEY geared head
16"x6' PRATT & WHITNEY grd. head
16"x6' CINCINNATI
16"x8' CINCINNATI geared head
16"x8' LODGE & SHIPLEY grd. head
16"x9' LEHMANN geared head
16"x10' LEBLOND
18"x10' MORRIS geared head
20"x8' MONARCH
20"x10' REED PRENTICE grd. hd.
20"x12' MORRIS grd. head
21"x18' LEBLOND
22"x10' DAVIS
22"x10' RAHN LARMON
24"x10' HENDEY
24"x12' LODGE & SHIPLEY
24"x14' AMERICAN grd. head
24"x16' BOYE & EMMES
26"x11' WICKES
26"x12' HENDEY
42"x24' PUTNAM geared head

LATHES, TURRET
Nos. 2, 2A, 3A & 6 W.&S.
Nos. 1B, 3 & 4 FOSTER
18" LIBBY
21" GISHOLT
1½", 3¼" CINCINNATI ACME
24" BULLARD vertical

MILLERS
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No. 2 Hvy. & 3B B & SHARPE
Nos. 2A & 2 Hvy. Mfg. MILW.
No. 4 HENDEY
No. 4 LEBLOND
No. 2½ ROCKFORD
No. 3 KEMPSMITH
No. 4 LEBLOND
No. 2 B. & S. universal
No. 3 CINCINNATI universal
Nos. 3 & 4 CINCINNATI vertical
Nos. B1 & 6 BECKER vertical

MILLERS—Continued
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HANSON WHITNEY thread miller
Nos. 13B & 33 B. & S. Mfg.
Nos. 1 & 2 KENT OWENS hand
66"x36"x8' INGERSOLL adj. rail
30" & 42" INGERSOLL rotary
48" & 54" NEWTON rotary
DAVIS & THOMPSON drum
Model C BECKER vertical
No. 3 SUNDSTRAND Rigidmil
28" 37" & 42" BRIGGS
TAYLOR & FENN spline

PLANERS
24"x24"x2' CINCINNATI crank
24"x24"x6' GRAY
32"x32"x12' NILES
36"x36"x10' CINCINNATI
36"x36"x16' CLEVELAND openside
42"x30"x10' LIBERTY openside
48"x36"x10' LIBERTY openside
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750 ton Baldwin Southwark triple action hydraulic toggle, 11'10½" between uprights, 84" shut height, 37", 26" & 13" strokes, 500,000 lbs.
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50" No. 60D50 CLEVELAND dbl. cr.
600 ton No. 664 TOLEDO knuckle joint embossing
No. 164 Toledo toggle drawing
No. 1½ BLISS toggle drawing
No. 266 CONSOLIDATED cam draw
No. DDG54 FERRACUTE cam draw
Nos. 55½, 56, 56½, 57½ TOLEDO
Nos. 56½, 62, 65, 66 CONSOLIDATED
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No. 30 ¾" BLISS arch frame
No. 8-7 ZEH & HAHNEMANN
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Nos. P4 & PG4 FERRACUTE
No. EG35 ERIE punching
No. 94 CONSOLIDATED punching
Nos. 4I & 4IA TOLEDO horning
No. 75 TOLEDO openback
40 ton WAT. FARREL openback
No. 5-1 CLEVELAND OBI
No. 5 TOLEDO OBI
No. 7 CLEVELAND OBI
71 ton W.F. OBI
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No. 2 STANDARD screw

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16" WALCOTT
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24" CINCINNATI shaper planer
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20 KW, 28" TOLEDO spot
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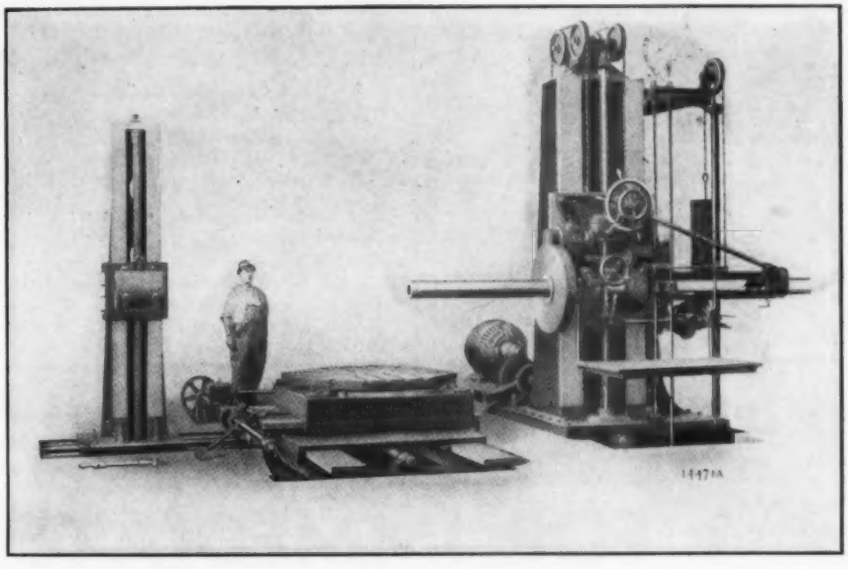

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36″ Bullard; 2 swivel heads; Belt Drive.

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#65 Heald Cylinder.
#1 Fraser Universal & Tool.
#12 Diamond Double Spindle Disc.

Turret-Lathes

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#4 Warner & Swasey Plain; Belt Drive.
24″ Gisholt, 6¼″ spindle; Belt Drive.
#5 Foster Geared Head; Single Pulley Drive.
3″ x 36″ Jones & Lamson; Single Pulley Drive.

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PRESS, #C-4 Ferracute Inclinable; 2″ stroke; Steel Frame; Motor Drive.
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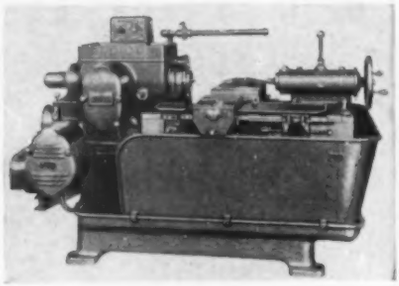

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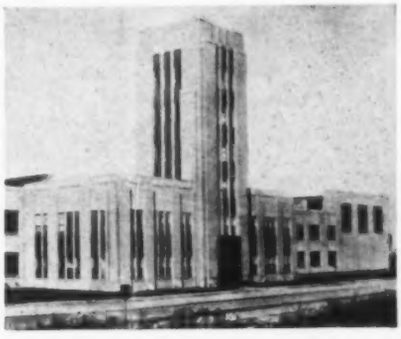

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9/16" Gridley Model "G" M.D.
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16x10' Prentice Geared Head
18"x10' Lodge & Shipley Geared Head

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48" Cincinnati Auto. Mfg.
#2 Kempsmith Vert. Maximiller
#3 Brown & Sharpe Univ.
#2 Kempsmith Univ.
#13B Brown & Sharpe Automatic
#33 Brown & Sharpe Automatic
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Colburn #D-2 **Heavy Duty Drill.**
12" **Curtis Pipe Machine,** M. D.
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15-ton P&H 38'4" span, 230-V. D.C.
2—15-ton Northern 69'6" span, 220-V. A.C.
15-ton Niles 86'6" span, 230-V. D.C.
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20-ton Northern 75'0" span, 220-V. 3-PH. 25-CY.
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5" bar Barrett #2 Cyl. Borer
5" bar Niles Floor Type
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2½" bar N.B.P., knee type M/D

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4 Spindle Kokomo No. 3 M.T.
4 Spindle Barnes Heavy Duty

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24" Steinle, 6¼" H.S.
3¼"x36" Cincinnati Acme, Grd. Hd.
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48"x40' Fitchburg
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42"x18' Pittsburgh, Q.C.G. Cone
36"x22' Pond Geared Head
32"x21' Schumacher Boye, Cone
32"x17' Fifield, triple grd.
32"x14' Boye & Emmes, Cone
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24"x12' LeBlond, Taper
24"x12' Putnam Q.C.G. Cone
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20"x10' Greaves Klusman Cone
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24" Gould & Eberhardt Shaper
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16" American Shaper

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#2 Landis Universal
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#103 Rivett Internal
#6 Bryant Chucking
#26-18" Besly Disc

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Model CS Becker Continuous
Model B Becker Vert. S.P.D.
#5B Becker Vert.
#4G LeBlond, Grd. Hd.
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MISCELLANEOUS

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Gear Hobber, #12 Barber Coleman
Gear Planer, 24" Gleason Bevel
Broach, #3B Lapointe M/D
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Header 2" Acme, Steel
Billet Breaker, 5" Ajax
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Keyseaters, No. 1 Baker, No. 1 Davis

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Rolls, 20'x⅝" H & J No. 6
Rolls, 14'x1" Wickes M/D
Rolls, 10'x½" Niles M/D
Rolls, Straightening, 7'x1" NBP
Slotter, 24" Newton M/D
Slotter, 15"-18" Dill
Shear, Dble Angle, 8"x8"x1" H & J #4 on Turntable
Shear, #X Cleveland, 30"
Shear, 156"x¼" United, 36" gap
Shear, 126"x¼" Amer., 22" gap
Shear, 126"x¼" Niag., 18" gap
Punch, 36" Whiting #6, ¾x½"
Punch & Shear, 54" H&J No. 2, Dble End
Punch & Shear, No. 47, P.B.C. Buffalo
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Saw, 12"x15" Racine #9B
Saw, 8" Higley #17 Cold
Saw, 6" Avey-Milband Band
Saw, 6" Cochrane Bly #4, Cold
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Press, No. 8½ Z & H Percussion
Press, No. 74, Bliss Consolidated
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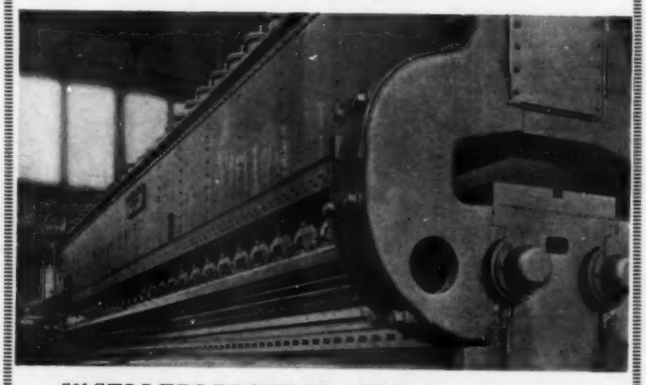

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1000 amp. Hanson Van Winkle, 6 volt (plating). 220/3/60 motor.

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UNUSUAL OFFERING
Leland-Gifford 6 Spindle High Speed Drill Ball Bear. Motor on each Spindle.

GISHOLT VERT. BORING MILL 42" power rap. trav. ext. height. Md.

NAZEL AIR HAMMER 4N. Md.

PUTNAM LATHE 36" x 18' b. dr. triple geared, q.chge.

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GOULD & EBERHARD SHAPER 28" m.dr. thru gear box.

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Allis-Chalmers Rotary Compressor, 238 cu. ft. Direct M.D.

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110" NEWTON HIGH DUTY MOTOR DRIVE

Capacity: 110" Dia., 20" Face.

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6½" BAR HORIZONTAL, DETRICK & HARVEY, FLOOR TYPE, MOTOR DRIVE

Capacity 12' Vert., 16' Horiz. Trav.

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BROWN & SHARPE MACHINERY

GRINDERS —

6—#10 Brown & Sharpe, Plain
4—#11 Brown & Sharpe, Plain
2—# 1 Brown & Sharpe, Universal
2—# 2 Brown & Sharpe, Cutter and Reamer
3—# 3 Brown & Sharpe, Cutter and Reamer

MILLING MACHINES —

2—# 0 Brown & Sharpe, Plain
4—#0Y Brown & Sharpe, Plain
2—#1Y and #2Y Brown & Sharpe, Plain
1—#13B Brown & Sharpe, Mfg. type

AUTOMATIC SCREW MACHINES —

#0 Brown & Sharpe Hand Screw
#1 Brown & Sharpe Hand Screw
#2 Brown & Sharpe Hand Screw
#00 Brown & Sharpe, Automatic
3—#00G Brown & Sharpe, Automatic
#00 Brown & Sharpe, High Speed Turret Former
3—#0 Brown & Sharpe, Automatics
5—#0 Brown & Sharpe, Automatics, High Speed, with Auto. Rod Magazines
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2—#2G Brown & Sharpe Automatics

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Cincinnati #4 Plain, cone driven
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Motor Drive, 10 speed gear changes, constant speed motor.

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No. 177 Toledo, Toggle Drawing
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No. 1006-C Bliss triple acting
No. 6-C, Cam Drawing
No. 84 Bliss, 10" Stroke
No. 85 Bliss, 10" Stroke
No. 86 Bliss, 14" Stroke
No. 76½ Bliss, 16" Stroke
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SEARCHLIGHT SECTION

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#1B K & T, plain, sgl. pul. dr.
#2B Milwaukee, dbl. ovrm. M.D.
#1½ B & S, Pl. cone drive
#2 Cinci. pl. rap. trav. m.d.
#2 Kemp. pl. Maxi-Mil. m.d.
#3 Cinci. pl. rap. trav. m.d.
#3B Milwaukee, dbl. ovrm. pl. R.T. m.d.
#4B Hvy. B & S, pl. m.d.
#5 Cinci. rec. ovrm. pl. m.d.
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We carry a large stock of used Machine Tools. Your inquiries will be appreciated.

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No. 4 Milwaukee Vert. Mill, motor in base
16"x6' Monarch Geared Head Engine Lathes, motor in base—Timken bearing spindle
No. 3 Brown & Sharpe Plain Mill
No. 2 Cincinnati Plain Mill—S.P.D.
10' 10 gauge Loy & Nawrath Shear
No. 2A-3A Warner & Swasey Turret Lathes
No. 4 Warner & Swasey Universal Turret Lathe
No. 5A Lees Bradner Gear Generator
No. 3—12 Barber Colman Gear Hobbers
No. 7 Fellow Gear Shaper
No. 13 Brown & Sharpe Gear Cutter
No. 70 Heald Internal Grinder
No. 4 Brown & Sharpe Universal Grinder
No. 11 Brown & Sharpe Grinder—M.D.

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Gray Planers: 36"x12', 4 hds; 36"x14', 42"x10'
Shapers: 24" G&E; 24" Barker; 3, 16"
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Lathes: 25"x12' Sidney; 18"x8' Monarch, 14"x6' Monarch
Milling Machines: #4-#3 LeBlond Plain; #1-½; #25
Drill Presses: 28", 24" Hoefer, 25", 20"; several high speed
Hack Saw: 6x6 Peerless, h.s.; 6x6 L.W. h.s.
Radial Drills: 3½' Silver; 5' Bausch
Turret Lathes: #4 Woods; 21" and 24" Gisholt
Welders: New Marquette—low price
Presses: No. 24 Toledo Open Back Cam Drawing No. 0 and #1, #2, #3 Federal O.B.I.
300 Other Machinery Items
MOTORS—New 5 HP 3 phase, ball brg. $55.75
Other sizes equally low priced. Also rebuilt motors.

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COLUMBUS, OHIO

1—#2 **Pratt & Whitney Jig Borer,** complete, Serial #188.
1—#7 **Fellows L.S. Gear Lapper.**
1—#10 **Fellows L.S. Gear Lapper.**
1—**Pratt & Whitney Duplex Mill.**
3—4" **Pratt & Whitney Spline Mills.**
2—**Fitchburg Universal Spline Grinders.**
3—#6A **Potter & Johnson Turret Lathes.**
1—**U.S. Electric Tool Company Grinder.**
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1—**Twin #12 Oilgear Broach.**
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Adams 1914

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Automatics, #2G Brown & Sharpe, S.P.D.
Boring Mills, 52" Bullard, 2 swivel Heads
Grinders, 16x48 Landis & Norton, Crank Shaft
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Presses, Toledo #56 Trimming with Side Shear
Shapers, 20" G&E cone & 24" Cincinnati, Cone
And Many More Good Tools

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Automatic 9/16" "C" Nat. Acme, M.D.
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Grinder, roll Farrel 28"x76" M.D.
42"x42"x12' Cin. Planer, 3 heads
Lathe, Turret 2-A & #3-A W&S SPD.
Lathe, 42"x16' S.B. B.D.
#20 W-F Thread Roller, ¾" cap.
Press, Forging 150 Ton United

WEST PENN MACHINERY COMPANY
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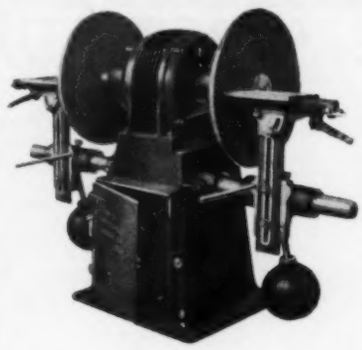

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3—#41 Besly 20" M.D.
1—#7½ Gardner 30" M.D.
1—#8 Hisey 20" M.D.
1—Gardner 25" M.D.
3—#2 Gardner 18" M.D.

(Opposed Type)

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1—#6 Besly 20"
1—#84A Gardner 22"
1—#27 Gardner 22"
1—#84–16" Gardner Hydr.
1—#14 Gardner 16"
1—#123 Gardner Hydr. 16"
1—Standard 36"

(Horizontal)

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1—#86 Gardner 30"

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Do You Need . . . 100% Rebuilt Tools Tomorrow?

For thirty years MONARCH has made it a standard practice to rebuild tools 100% and keep them in stock so that when a customer needs tools in a hurry, he can phone or write us and have his needs filled with 100% rebuilt tools —WITHOUT WAITING.

All Monarch Rebuilt Tools Are Sold on Approval

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Est. 1909
329 N. 3rd St., Philadelphia, Pa.

EMCO REBUILT MACHINE TOOLS

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14"x6' Lodge & Shipley Selective Head
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14"x6' Prentice Geared Head
14"x8' Hendey Geared Head, taper
16"x7' Pratt & Whitney Tool Room
16"x8' Prentice Geared Head
17"x8' Sidney, cone
18"x8' Prentice Geared Head
18"x10' Boye & Emmes Geared Head
18"x12' American Geared Head
18"x10' Prentice Geared Head
20"x9' Lehman Geared Head, taper
21"x8' LeBlond Geared Head, taper
22"x12'10" Greaves-Klusman Geared Head, taper
24"x10' American, cone
24"x10' Prentice Geared Head
24"x10' Bridgeford, cone
24"x20' LeBlond, cone
25"x12' LeBlond, cone
26"x12' Boye & Emmes, cone
27"x12' Prentice Geared Head, taper
36"x12' Bridgeford Geared Head, taper
36"x16' American Geared Head
36"x20' Johnson, cone

GEAR MACHINERY

No. 12 H8 Gould & Eberhardt Mfg. Hobber
6" Gleason Straight Bevel Gear Generator
12" Gleason Gear Planer
No. 3-26 and 3-36" Brown & Sharpe Gear Cutters
No. 5A Lees-Bradner Gear Generator
No. 12 Barber-Colman Gear Hobbers
No. 12 Barber-Colman Dble Overarm Gear Hobbers
16" Cincinnati Gear Hobber, m.d.
No. 16HS Gould & Eberhardt Gear Hobber, typ. C
No. 18HM 2 spindle Gould & Eberhardt Gear Hobber
No. 44 Brown & Sharpe Gear Hobber, m.d.

TURRET LATHES

No. 1A, 2A, 3A Warner & Swasey Universals, m.d.
No. 1B Foster Universal, m.d.
No. 0, 1, 2, 4 Foster Turret, cone
No. 2 Bardons & Oliver, geared head
No. 2 Gisholt Turret, variable speed m.d. drive in base
No. 3 Foster All Geared, m.d.
No. 3 Foster, variable speed m.d. in base
No. 3 Gisholt Geared Head, m.d.
No. 3 L Gisholt, m.d.
No. 2, 4, 6 Warner & Swasey, cone
No. 4 Warner & Swasey Universal, cone
No. 5A, 6A Potter & Johnston Automatic, m.d.
No. 6D Potter & Johnston Automatic, m.d.
No. 4, 7 Bardons & Oliver
No. 23, 24 New Britain Automatics
No. 54 National Acme Automatic, belt
3x36" Jones & Lamson 3 spdle Flat Turret, s.p.d.
3x36" Jones & Lamson Flat Turret, m.d.
3¼x36" Cincinnati Acme Flat Turret, m.d.
18" Acme Turret, cone
20" Acme Turret, cone
21" Gisholt Turret, cone
22" Libby Turret, geared head

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No. 2, 3 Cincinnati Plain Dial Type, m.d. in base, Timken Bearings, latest type
No. 3 Cincinnati Plain C Type, m.d. in base, rect. overarm
No. 1, 2 Cleveland Plain, s.p.d.
No. 2 Van Norman, m.d.
No. 3 Kempsmith Plain, cone
No. 4B Brown & Sharpe Plain, s.p.d.
No. 2, 3, 4 Cincinnati Plain, cone
No. 4 Kempsmith Plain MaxiMiller, m.d. in base
24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
48" Cincinnati Worm Driven Plain Automatic, m.d.
48" Cincinnati Worm Driven Duplex Automatic, m.d.
No. 2 Brown & Sharpe Universal, cone, taper spindle
No. 4B, 5, 5C, 6 Becker Vertical, cone

24' Niles Bending Rolls, pyramid type, strong back shipyard type. Capacity 1" plate. Weight 154,000 lbs. In practically new condition

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SQUARE SHEARS

No. 396 Robinson Square Shear, cap. 10 ga. by 8'
No. 465 Bliss Power Gap, cap. 8'x¼"
10' Geo. A. Ohl, cap. 10 ga. by 3/16"
Long & Allstatter Type C, cap. 82"x¾"

Partial Listing only.
Ask for Stock List.

The EASTERN MACHINERY CO.
1004 TENNESSEE AVE.
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Box Numbers in care of our New York, Chicago or San Francisco offices count 10 words additional in undisplayed ads. Replies forwarded without extra charge.

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(See also "Selling Opportunities Offered")

WANTED: By a New England shop making high-grade machine tools capable draftsmen for lay-out and detail work on machine tool development and design. P-639, American Machinist, 330 W. 42nd St., New York, N. Y.

ASSISTANT TO SHOP MANAGER; under 45 years of age. Good opportunity with large industrial company in the east operating their own machine shop, foundry and pattern shop. Must be good leader and handler of foremen. Technical education preferred but more importance attached to good experience in production or jobbing shop work, on both light and heavy machines. Thorough knowledge of shop tools, quality workmanship, planning and cost control necessary. Foundry experience and knowledge of wood working shop highly desirable. Give complete record of experience on each job held, age, education, last salary and salary desired, as well as references. P-640, American Machinist, 330 W. 42nd St., New York, N. Y.

WANTED

WORKS MANAGER

Leading maker of high grade machinery, with modern plant and highest rating, is looking for capable executive experienced in plant management and building of medium and heavy machinery.

This is a real opportunity for A1 mechanic with consistent record of successful accomplishment, who is looking for broader opportunities and future, with commensurate compensation.

First letter should give experience, with whom and for how long, age, references and salary expected. Correspondence confidential.

P-626, American Machinist
330 West 42nd St., New York, N. Y.

WANTED

First Class-All Around MACHINIST

with some inventive ability to act as working leader in a small developmental shop. Good opportunity for future advancement. State education and training. Address

P-637, American Machinist
330 West 42nd St., New York City

MACHINE SHOP ENGINEER

Needed by a plant in Hong Kong, experienced in the manufacture of automobile engines, able to take full charge, preferably worked many years in engine factory and advanced to the position of foreman or higher;

also a

TOOLMAKER AND DESIGNER

experienced in making and designing jigs, fixtures and tools for automobile engine and parts, preferably worked many years in automobile plant and advanced to the position of foreman or assistant to chief of toolroom. Please state nationality, age, qualifications, expected salary, etc. Also include postage for forwarding letter by airmail, 70 cents per half ounce.

P-649, American Machinist,
520 No. Michigan Ave., Chicago, Ill.

POSITIONS VACANT

FACTORY SUPERINTENDENT, for a leading manufacturer aircraft accessories and other precision products now employing about 100 in machine shop. Must be expert mechanic as well as good mechanical engineer. Must be thoroughly familiar with modern machine tools and production methods, and have a record of past experience in precision manufacturing. Age 30-45. Location suburban New York. P-647, American Machinist, 330 W. 42d St., New York, N. Y.

FIRST-CLASS TOOL DESIGNER wanted by progressive concern in New England. Must have extensive designing experience on jigs, fixtures, cutting tools, etc. and be capable of producing practical designs with a minimum of supervision. Give full particulars as to experience, age, etc. P-644, American Machinist, 330 W. 42nd St., New York, N. Y.

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SALARIED POSITIONS. $2,500 to $25,000. This thoroughly organized advertising service of 29 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated above, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreement. Identity is covered and, if employed, present position protected. If your salary has been $2,500 or more, send only name and address for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo, N. Y.

We can place immediately with outstanding manufacturers: Manufacturing Executives, General Machine Shop Foremen, Heavy Machine Designers, Tool Engineers, Production and Time Study Men, also recent graduate engineers as juniors. If you are really good give us full details about yourself in strict confidence. Curt E. Patton, Personnel Engineers, 53 W. Jackson, Chicago.

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(See also "Selling Opportunities Wanted")

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FACTORY MANAGER or Superintendent wide Range of Executive and Manufacturing experience in varied lines, so as to obtain quality and maximum production, excellent references with small and large concerns, open for connection. PW-638, American Machinist, 330 W. 42nd St., New York, N. Y.

EXPERIENCED MECHANICAL DESIGNER, technically trained, age 44, machine shop and electrical background. Location New York City or communicating distance. PW-641, American Machinist, 330 W. 42nd St., New York, N. Y.

FOREMAN Machine Shop, Production and Repair Shop experience, open for personal interview. PW-642, American Machinist, 520 N. Michigan Ave., Chicago, Ill.

ASSISTANT SUPERINTENDENT capable of pushing production, putting in effect new ideas in equipment-tools, also safety work, would like an interview. PW-643, American Machinist, 330 W. 42nd St., New York, N. Y.

GEAR ENGINEER with long and varied experience in design and manufacture. Experienced shop executive with thorough knowledge of all details of plant operation. Equally capable of supervision design and manufacture and getting maximum results at lowest cost. PW-645, American Machinist, 330 W. 42nd St., New York, N. Y.

POSITIONS WANTED

SUPERVISOR of tool and gage inspection department 10 years. Experience, in tool and gage design, and standards, supervision of help, modern manufacturing methods. Three year technical background. Employed. Want position in Mfg., Insp., or as field representative. PW-648, American Machinist, 330 W. 42d St., New York, N. Y.

WORKS MANAGER, Superintendent, Assistant Superintendent, Technical Education. Experienced in machine, plate, structural, welding and forge shop practice and gray iron foundry practice including mixing to analysis. Experience covers production of various types of light, medium and heavy machinery and equipment. Am good organizer and handler of men and a producer. PW-628, American Machinist, 520 N. Michigan Ave., Chicago, Ill.

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ENGINEER, automatic machine, tool designer. Twenty-four years experience. All and many satisfied clients. 6819 Harrow St., Forest Hills, NY City.

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OPPORTUNITIES OFFERED

SALES REPRESENTATIVE to sell improved Machine Tool on commission basis, state territory, references. Tietzmann Engineering Co., Highland Ave., Dayton, Ohio.

FOREIGN REPRESENTATION

is offered by prominent importer and exporter of machine tools, established 30 years and having excellent connections abroad.

Highest references about proven sales records and first class financial rating can be furnished.

Can also assist in domestic distribution and in financing, if necessary.

If interested send complete information of your products to

RA-651, American Machinist
330 W. 42nd Street, New York, N. Y.

(Continued on opposite page)

SEARCHLIGHT SECTION

Entire Plant For Sale or Lease

LAND, BUILDINGS, MACHINERY

OF THE

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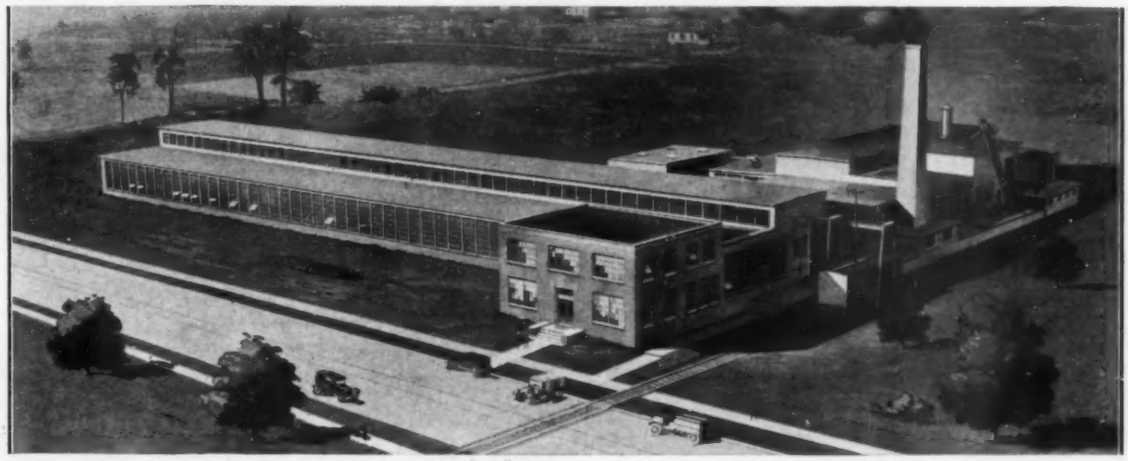
(Manufacturers of Multiple, Drilling & Tapping Machines)



An unusually modern plant fully equipped for general purpose manufacturing. Comprising 48,000 sq. ft. of floor space, day light construction throughout. Buildings with electric overhead cranes, railroad sidings. 6¼ acres of land. Well situated in Jackson affording low taxes, abundance of labor and excellent living conditions.

PLANT FOR SALE OR LEASE WITH OR WITHOUT MACHINERY

For further particulars inquire of

WESTERN INDUSTRIES, INC.

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As specialists in machine tool, instrument and machinery lines we have successfully introduced and sold in this country millions of dollars worth of goods, largely on imported lines.

After thirty years experience we have built up a sales organization that covers all major industrial centers. We are now looking for a few specialties that can be sold to the machine shop and metal manufacturing trades, either in the NEW YORK metropolitan area or nationally.

We have been particularly successful in selling newly developed products but will also consider established lines on which the manufacturer wishes to relegate the sales responsibilities to experts in this field or on which he is not entirely satisfied with present sales.

Our organization consists of trained, technical men, demonstrators and engineers, who know the machine tool business in all its ramifications. In addition we have a completely equipped service shop and a showroom in the heart of New York's machinery district. We also maintain an export department.

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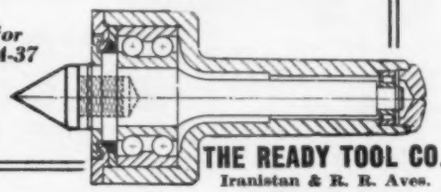

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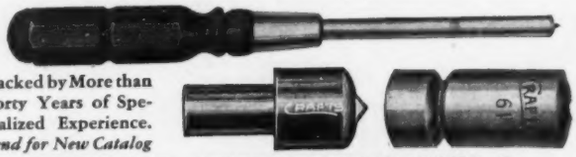

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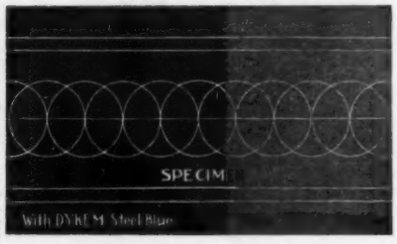

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West Penn Machy. Co., Pittsburgh, Pa.
Wigglesworth Machinery Co., Cambridge, Mass.

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Reed-Prentice Corp., Worcester, Mass.

DIE FEEDS
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Henry & Wright Mfg. Co., Hartford, Conn.

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Haskins Co., R. G., Chicago, Ill.
Oliver Inst. Co., Adrian, Mich.

DIE-MAKERS Blue
Dykem Co., St. Louis, Mo.

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Baumbach Mfg. Co., E. A., Chicago, Ill.
Danly Mach. Spec. Co., Inc., Chicago, Ill.
U. S. Tool Co., Ampere, N. J.

DIE Sets
U. S. Tool Co., Ampere, N. J.

DIE Sinking Machines
Cincinnati Milling Mach. Co., The, Cincinnati, Ohio

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Geometric Tool Co., New Haven, Conn.
Greenfield Tap & Die Corp., Greenfield, Mass.
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Landis Mach. Co., Waynesboro, Pa.
Modern Tool Works, Div. of Consolidated Mach. Tool Corp. of America, Rochester, N. Y.
Murchey Machine & Tool Co., Detroit, Mich.

WHERE-TO-BUY DIRECTORY

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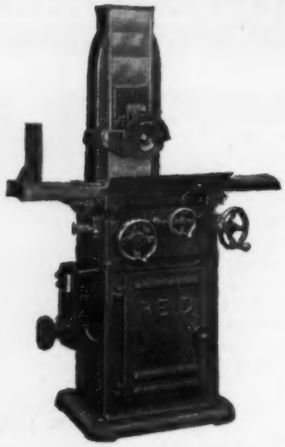

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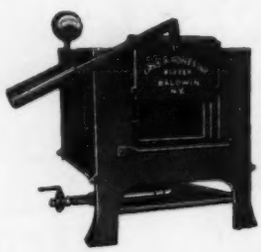

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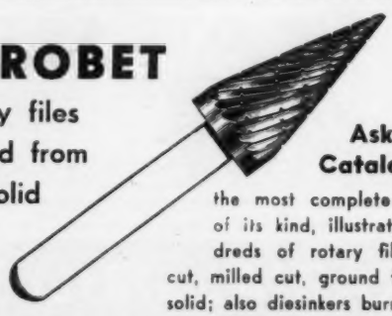

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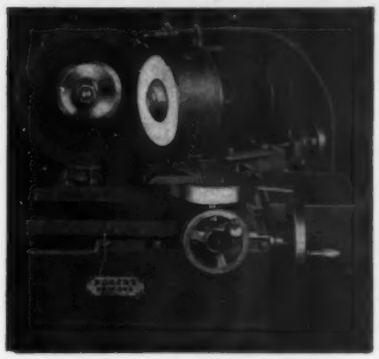

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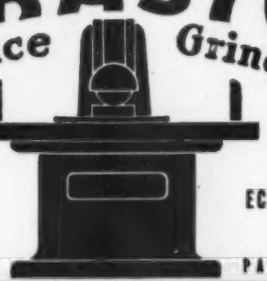

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Cincinnati Grinders, Incorporated, Cincinnati, Ohio
Heald Mach. Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING Machines, Die
Abrasive Machine Tool Co., East Providence R. I.
Arter Grinding Machine Co., Worcester, Mass.
Bryant Chucking Grinder Co., Springfield, Vt.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Heald Machine Co., Worcester, Mass.
Landis Mach. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Rivett Lathe & Grinder, Inc., Boston, Mass.
Walker Co., O. S., Worcester, Mass.

GRINDING Machines, Disc
Gardner Machine Co., Beloit, Mich.

GRINDING Machines, Drill
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Oliver Inst. Co., Adrian, Mich.

GRINDING Machines, Face or Ring Wheel
Abrasive Mach. Tool Co., East Providence, R. I.
Graham Mfg. Co., Providence, R. I.
Walker Co., O. S., Worcester, Mass.

GRINDING Machines, Flexible Shaft
Haskins Co., R. G., Chicago, Ill.

GRINDING Machines, Floor
Hisey-Wolf Machine Co., Cincinnati, Ohio
Norton Co., Worcester, Mass.
Walker Co., O. S. Worcester, Mass.

GRINDING Machines, Gage
Abrasive Mach. Tool Co., East Providence, R. I.
Landis Tool Co., Waynesboro, Pa.

GRINDING Machines, Gear
Gear Grinding Machine Co., Detroit, Mich.
Lees-Bradner Co., Cleveland, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.

GRINDING Machines, Hole & Face
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDING Machines, Hydraulic
Cincinnati Grinders, Incorporated, Cincinnati, Ohio
Norton Co., Worcester, Mass.

GRINDING Machines, Internal
Bryant Chucking Grinder Co., Springfield, Vt.
Heald Mach. Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Rivett Lathe & Grinder Inc., Boston, Mass.
Thompson Grinder Co., Springfield, Ohio
Walker Co., O. S., Worcester, Mass.

GRINDING Machines, Lathe Attachment
Dumore Co., Racine, Wis.

GRINDING Machines, Piston Ring
Heald Mach. Co., Worcester, Mass.

GRINDING Machines, Plain
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders Incorporated, Cincinnati
Norton Co., Worcester, Mass.

GRINDING Machines, Portable
Dumore Co., Racine, Wis.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Ingersoll-Rand Co., New York, N. Y.
Porter-Cable Machine Co., Syracuse, N. Y.
Standard Electrical Tool Co., Cincinnati, Ohio

GRINDING, Machines, Pulley
Abrasive Mach. Tool Co., East Providence, R. I.
Graham Mfg. Co., Providence, R. I.

GRINDING Machines, Radial
Van Norman Machine Tool Co., Springfield, Mass.

GRINDING Machines, Ring
Arter Grinding Machine Co., Worcester, Mass.

GRINDING Machines, Roll
Cincinnati Grinders Incorporated, Cincinnati, Ohio
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Norton Co., Worcester, Mass.

GRINDING Machines, Snagging
Standard Electrical Tool Co., Cincinnati, Ohio

GRINDING Machines, Surface
Abrasive Mach. Tool Co., East Providence, R. I.
Arter Grinding Machine Co., Worcester, Mass.
Blanchard Machine Co., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Gardner Machine Co., Beloit, Wis.
Heald Machine Co., Worcester, Mass.
Mattison Machine Works, Rockford, Ill.
Norton Co., Worcester, Mass.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Reid Brothers Co. Inc., Beverly, Mass.
Walker Co., O. S., Worcester, Mass.

GRINDING Machines, Tap
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Oliver Instrument Co., Adrian, Mich.

GRINDING Machines, Tool Room
Bryant Chucking Grinder Co., Springfield, Vt.
Norton Co., Worcester, Mass.

GRINDING Machines, Universal
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Grinders, Incorporated, Cincinnati, Ohio
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Norton Co., Worcester, Mass.
Thompson Grinder Co., Springfield, Ohio

GRINDING Machines, Vertical
Cincinnati Bickford Tool Co., Cincinnati, O.
Walker Co., O. S., Worcester, Mass.

GRINDING Wheels
Carborundum Company, Niagara Falls, N. Y.
Gardner Machine Co., Beloit, Wis.
Macklin Co., Jackson, Mich.
Norton Co., Worcester, Mass.
Vitrified Wheel Co., Westfield, Mass.

GROUND Flat Stock
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett Co., L. S., Athol, Mass.

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Ingersoll-Rand Co., New York, N. Y.
Nazel Engineering Co., Philadelphia, Pa.

HAMMERS, Power
Murray Mfg. Co., D. J., Wasau, Wis.

HAMMERS, Soft Faced
Greene, Tweed & Co., New York, N. Y.

HANDLES, Crank & Machine
Williams and Co., J. H., Buffalo, N. Y.

HANGERS
Brown & Sharpe Mfg. Co., Providence, R. I.

HANGERS, Shaft
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Div. General Motors Corp., Newark, N. J.
Marlin-Rockwell Corp., Jamestown, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa.

HARDNESS Measuring Instruments
Bausch & Lomb Optical Co., Rochester, N. Y.
Shore Inst. & Mfg. Co., Jamaica, L. I., N. Y.

HEADS, Drilling Machine
Ettco Tool Co., Brooklyn, N. Y.

HEATERS, Unit
Buffalo Forge Company, Buffalo, N. Y.

HEAT Treating
Ex-Cell-O Corp., Detroit, Mich.
National Erie Corp., Erie, Pa.
Wiedemann Machine Co., Philadelphia, Pa.

HOBBING Machines
Adams Company, Dubuque, Iowa
Gould & Eberhardt, Newark, N. J.

HOBS
Brown & Sharpe Mfg. Co., Providence, R. I.
Hanson-Whitney Machine Co., Hartford, Conn.
Michigan Tool Co., Detroit, Mich.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

HOISTS & Cranes, Elec. Traveling
Philadelphia Gear Works, Philadelphia, Pa.

HOISTS & Cranes, Pneumatic
Curtis Pneumatic Machinery Co., St. Louis, Mo.

HOISTS
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

HOISTS, Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

HOISTS, Hand
Ford Chain Block Division American Chain Co., Philadelphia, Pa.

HOISTS, Pneumatic
Ingersoll-Rand Co., New York, N. Y.

HONING Machines
Barnes Drill Co., Rockford, Ill.
Micromatic Hone Corp., Detroit, Mich.

HYDRAULIC Machinery
Oilgear Co., Milwaukee, Wis.
Watson-Stillman Co., New York, N. Y.

HYDRAULIC Power Units
Ex-Cell-O Corp., Detroit, Mich.

INDEXING Fixtures
Hartford Special Machinery Co., Hartford, Conn.

INDICATORS, Dial
Federal Products Corp., Providence, R. I.
Starrett Co., L. S., Athol, Mass.

INDICATORS, Speed and Test
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett Co., L. S., Athol, Mass.

INSTRUMENTS, Electric
General Electric Co., Schenectady, N. Y.

INSTRUMENTS, Light Wave
Bausch & Lomb Optical Co., Rochester, N. Y.
Van Keuren Co., Boston, Mass.

INSTRUMENTS, Precision
Federal Products Corp., Providence, R. I.

JOINTS, Universal
Boston Gear Works, Inc., North Quincy, Mass.
National Automatic Tool Co., Richmond, Ind.

KEYSEATING Machines
Baker Brothers, Inc., Toledo, Ohio.
Davis Keyseater Co., Rochester, N. Y.
Mitts & Merrill, Saginaw, Mich.
National Mach. Tool Co., Cincinnati, Ohio

KNURLS & Knurl Holders
American Swiss File & Tool Co., Elizabeth, N. J.
Williams and Co., J. H., Buffalo, N. Y.

LAMPS, Electric
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

LAPPING Machines & Attachments
Norton Co., Worcester, Mass.

LAPPING Machines, Centerless
Cincinnati Grinders, Incorporated, Cincinnati, Ohio

LATHE Attachments
Gisholt Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio

LATHE Center Nibs
McKenna Metals, Latrobe, Pa.

LATHE Tools
Carboloy Company, Detroit, Mich.
Gisholt Machine Co., Madison, Wis.

WHERE-TO-BUY DIRECTORY

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Ready Tool Co., Bridgeport, Conn.

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Bullard Company, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mach. Co., Springfield, Vt.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio
Porter-Cable Machine Co., Syracuse, N. Y.
Potter & Johnston Mach. Co., Pawtucket, R. I.
Warner & Swasey Co., Cleveland, Ohio

LATHES, Bench
Ames Co., B. C., Waltham, Mass.
Hardinge Brothers, Inc., Elmira, N. Y.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Rivett Lathe & Grinder, Inc., Boston, Mass.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Stark Tool Co., Waltham, Miss.

LATHES, Brass Workers
Gisholt Machine Co., Madison, Wis.
Warner & Swasey Co., Cleveland, Ohio

LATHES, Engine
American Tool Works Co., Cincinnati, Ohio
Axelson Mfg. Co., Los Angeles, Calif.
Boye & Emmes Machine Tool Co., Cincinnati, Ohio
Bryant Machinery and Engineering Co., Chicago, Ill.
Consolidated Mach. Tool Corp., Rochester, N. Y.
Hendey Machine Co., Torrington, Conn.
LeBlond Machine Tool Co., R. K., Cincinnati, Ohio
Lodge & Shipley Mach. Tool Co., Cincinnati, Ohio
Modern Tool Works, Rochester, N. Y.
Monarch Machine Tool Co., Sidney, Ohio
Morris Machine Tool Co., Cincinnati, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Reed-Prentice Corp., Worcester, Mass.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Mach. Tool Co., Springfield, O.

LATHES, Horizontal and Vertical Turret
Acme Machine Tool Co., Cincinnati, Ohio
Bardons & Oliver, Inc., Cleveland, Ohio
Foster Machine Co., Elkhart, Ind.
Gisholt Machine Co., Madison, Wis.
Greenlee Bros. & Co., Rockford, Ill.
Jones & Lamson Mach. Co., Springfield, Vt.
Warner & Swasey Co., Cleveland, Ohio

LATHES, Speed
Schauer Machine Co., Cincinnati, Ohio

LATHES, Toolroom
American Tool Works Co., Cincinnati, Ohio
Bryant Machinery and Engineering Co., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
LeBlond Machine Tool Co., R. K. Cincinnati, Ohio
Lodge & Shipley Mach. Tool Co., Cincinnati
Monarch Machine Tool Co., Sidney, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Reed-Prentice Corp., Worcester, Mass.
Sidney Machine Tool Co., Sidney, Ohio
South Bend Lathe Works, South Bend, Ind.
Springfield Machine Tool Co., Springfield, O.

LATHES, Vertical Turret
Bullard Company, Bridgeport, Conn.

LEATHER, Hydraulic
Chicago Rawhide Mfg. Co., Chicago, Ill.
Houghton & Co., E. F., Philadelphia, Pa.

LAYOUT Fluid
Dykem Co., St. Louis, Mo.

LIGHT Bulbs
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

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Houghton & Co., E. F., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Socony-Vacuum Oil Co. Inc., New York, N. Y.
Standard Oil Co. of Indiana, Chicago, Ill.
Stuart Co., D. A., Chicago, Ill.
Sun Oil Co., Philadelphia, Pa.
Tide Water Oil Sales Corp., New York, N. Y.

LUBRICATING Systems
Farval Corp., Cleveland, Ohio
Rivett Lathe & Grinder, Inc., Boston, Mass.

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General Electric Co., Schenectady, N. Y.

MACHINES, Abrasive Cutting
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

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Starrett Co., L. S., Athol, Mass.

MANDRELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.

MARKING Machines
Noble & Westbrook Mfg. Co., Hartford, Conn.

MATERIALS, Hard Surfacing
Metal Carbides Corp., Youngstown, Ohio

MEASURING Instruments
Norma-Hoffmann Bearings Corp., Stamford, Conn.

MEASURING Machines
Hanson-Whitney Machine Co., Hartford, Conn.

MELTING Pots
Hones, Inc., Chas. A., Baldwin, L. I., N. Y.

MELTING Pots, Electric
General Electric Co., Schenectady, N. Y.

METERS, Welding
Lincoln Electric Co., Cleveland, Ohio

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Slocomb Co., J. T., Providence, R. I.
Starrett Co., L. S., Athol, Mass.

MICROSCOPES
Bausch & Lomb Optical Co., Rochester, N. Y.

MILLING Attachments
Adams Company, Dubuque, Iowa
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine Co., The, Cincinnati, Ohio
Fray-Mershon, Inc., Glendale, Cal.
Kearney & Trecker Corp., Milwaukee, Wis.
Porter-Cable Machine Co., Syracuse, N. Y.
Potter Johnston Mach. Co., Pawtucket, R. I.

MILLING Machines, Automatic
Cincinnati Milling Mach. Co., The Cincinnati, Ohio
Kearney & Trecker Corp., Milwaukee, Wis.
U. S. Tool Co., Ampere, N. J.

MILLING Machines, Bench
Ames Co., B. C., Waltham, Mass.
Burke Machine Tool Co., Conneaut, Ohio.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Stark Tool Co., Waltham, Mass.

MILLING Machines, Continuous
Consolidated Mach. Tool Corp., Rochester, N. Y.
Kearney & Trecker Corp., Milwaukee, Wis.

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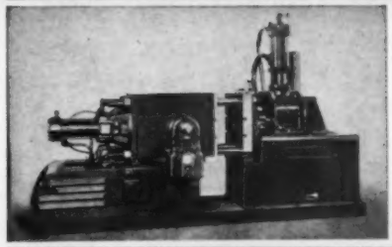

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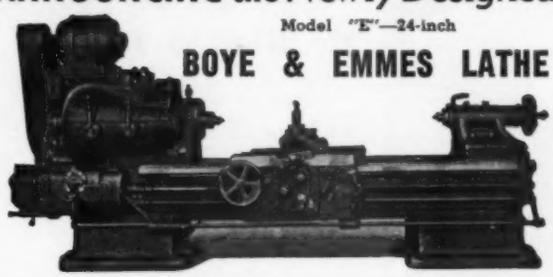

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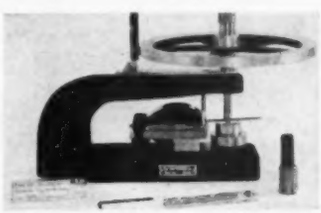

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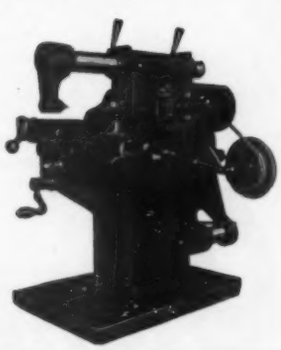

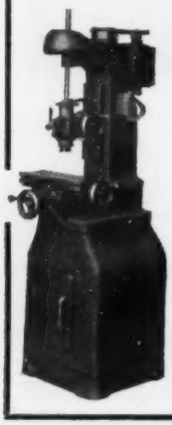

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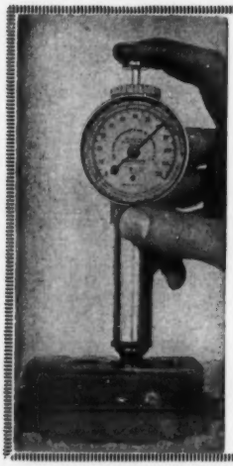

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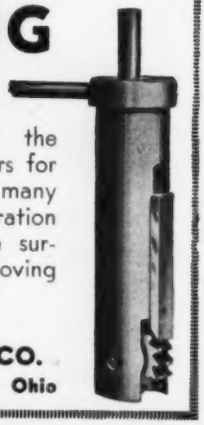

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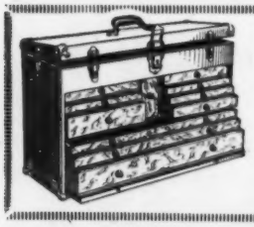

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Modern Tool Works, Rochester, N. Y.

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Kearney & Trecker Corp., Milwaukee, Wis.
Van Norman Machine Tool Co., Springfield, Mass.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Kent-Owens Machine Co., Toledo, Ohio

MILLING Machines, Multiple Spindle
Cincinnati Milling Mach. Co., The, Cincinnati, Ohio

MILLING Machines, Plain
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., The, Cincinnati, Ohio
Kearney & Trecker Corp., Milwaukee, Wis.
Kent-Owens Machine Co., Toledo, Ohio
Knight Machinery Co., W. B., St. Louis, Mo.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sidney Machine Tool Co., Sidney, Ohio

MILLING Machines, Planer Type
Cincinnati Planer Co., Cincinnati, Ohio
Consolidated Mach. Tool Corp., Rochester, N. Y.
Gray Co., G. A., Cincinnati, Ohio
Kearney & Trecker Corp., Milwaukee, Wis.
Modern Tool Works, Rochester, N. Y.
Niles Tool Works Co., Hamilton, Ohio

MILLING Machines, Planetary
Consolidated Mach. Tool Corp., Rochester, N. Y.
Modern Tool Works, Rochester, N. Y.

MILLING Machines, Precision Bench
Hardinge Brothers, Inc., Elmira, N. Y.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.

MILLING Machines, Profile
Consolidated Mach. Tool Corp., Rochester, N. Y.
Modern Tool Works, Rochester, N. Y.
Reed-Prentice Corp., Worcester, Mass.

MILLING Machines Semi Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING Machines, Thread
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Hanson-Whitney Machine Co., Hartford, Conn.
Lees-Bradner Co., Cleveland, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.

MILLING Machines, Turret
Bridgeport Machines, Inc., Bridgeport, Conn.

MILLING Machines, Universal
Bridgeport Machines, Inc., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., The Cincinnati, Ohio
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.
Knight Machinery Co., W. B., St. Louis, Mo.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sidney Machine Tool Co., Sidney, Ohio
Van Norman Machine Tool Co., Springfield, Mass.

MILLING Machines, Vertical
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Mach. Co., The, Cincinnati, Ohio
Consolidated Mach. Tool Corp., Rochester, N. Y.
Gorton Machine Co., Geo., Racine, Wis.
Kearney & Trecker Corp., Milwaukee, Wis.
Knight Machinery Co., W. B., St. Louis, Mo.
Linley Brothers Co., Bridgeport, Conn.
Modern Tool Works, Rochester, N. Y.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sidney Machine Tool Co., Sidney, Ohio
Van Norman Machine Tool Co., Springfield, Mass.

MILLING Machines, Worm
Cleveland Automatic Machine Co., Cleveland, Ohio.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.

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General Electric Co., Schenectady, N. Y.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Century Electric Co., St. Louis, Mo.
Dumore Co., Racine, Wis.
Howell Electric Motors Co., Howell, Mich.
Reliance Electric and Engineering Co., Cleveland, Ohio
Wagner Electric Co., St. Louis, Mo.
Wesche Electric Co., B. A., Cincinnati, Ohio
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

MOTORS, Fractional H. P.
General Electric Co., Schenectady, N. Y.

MOTORS, Integral-H. P.
General Electric Co., Schenectady, N. Y.

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Air Reduction Sales Co., New York City.

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De Laval Separator Co., New York, N. Y.

OIL Grooving Machines
National Mach. Tool Co., Cincinnati, Ohio

OIL Seals
Chicago Rawhide Mfg. Co., Chicago, Ill.

OIL Stones
Norton Co., Worcester, Mass.

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Houghton & Co., E. F., Philadelphia, Pa.
Socony-Vacuum Oil Co. Inc., New York, N. Y.
Stuart Co., D. A. Chicago, Ill.

OILS, Lubricating
Houghton & Co., E. F., Philadelphia, Pa.
Socony-Vacuum Oil Co. Inc., New York, N. Y.
Stuart Co., D. A., Chicago, Ill.

OILS, Quenching
Houghton & Co., E. F., Philadelphia, Pa.
Stuart Co., D. A., Chicago, Ill.

OXYGEN, Gas
Air Reduction Sales Co., New York City.

PARALLELS
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett Co., L. S., Athol, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S., Worcester, Mass.

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Boston Gear Works, Inc., North Quincy, Mass.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Div. General Motors Corp., Newark, N. J.
Marlin-Rockwell Corp., Jamestown, N. Y.
Stephens-Adamson Co., Aurora, Ill.

PIPE Cutting and Threading Machines
Landis Mach. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
Oster Mfg. Co., Cleveland, Ohio

PIPE Fitters Tools
Greenfield Tap & Die Corp., Greenfield, Mass.
Standard Tool Co., Cleveland, Ohio
Williams and Co., J. H., Buffalo, N. Y.

PIPE Plugs
Allen Manufacturing Co., Hartford, Conn.

WHERE-TO-BUY DIRECTORY

PLANERS
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.
Gray Co., G. A., Cincinnati, Ohio

PLANING Machines
Cincinnati Planer Co., Cincinnati, Ohio
Consolidated Mach. Tool Corp., Rochester, N. Y.
Modern Tool Works, Rochester, N. Y.
Niles Tool Works Co., Hamilton, O.
Ohio Machine Tool Co., Kenton, Ohio

PLATES, Aluminum
Aluminum Company of America, Pittsburgh, Pa.

PLATES, Steel
American Steel & Wire Co., Chicago, Ill.
Carnegie Illinois Steel (U. S. Steel Corp. Subsidiary), Pittsburgh, Pa.
Columbia Steel Co., (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Ingersoll Steel & Disc Div. of Borg Warner Corp., New Castle, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary) New York, N. Y.
U. S. Steel Corp., Pittsburgh, Pa.

POLISHING and Buffing Machines
Dumore Co., Racine, Wis.
Haskins Co., R. G., Chicago, Ill.
Heald Mach. Co., Worcester, Mass.
Hisey-Wolf Machine Co., Cincinnati, Ohio
Landis Tool Co., Waynesboro, Pa.
Mattison Machine Works, Rockford, Ill.
New Britain-Gridley Machine Co., New Britain, Conn.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Standard Electrical Tool Co., Cincinnati, Ohio
Union Twist Drill Co., Athol, Mass.

POLISHING Grains, Abrasive
Norton Co., Worcester, Mass.
Carborundum Company, Niagara Falls, N. Y.

PRESS Feeds
Dickerman Mfg. Co., H. E., Springfield, Mass.
U. S. Tool Co., Ampere, N. J.
V & O Press Co., Hudson, N. Y.

PRESSES, Foot & Hand
Niagara Machine & Tool Works, Buffalo, N. Y.

PRESSES, Forcing
Lucas Mach. Tool Co., Cleveland, Ohio
Oilgear Co., Milwaukee, Wis.
Watson-Stillman Co., New York, N. Y.

PRESSES, Forging
Ajax Mfg. Co., Cleveland, Ohio.
Niagara Machine & Tool Works, Buffalo, N. Y.

PRESSES, Forming
Minster Machine Co., Minster, Ohio

PRESSES, Hydraulic
Baldwin Southwark, Philadelphia, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
National-Erie Corp., Erie, Pa.
Oilgear Co., Milwaukee, Wis.
Watson-Stillman Co., New York.

PRESSES, Power
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.
Henry & Wright Mfg. Co., Hartford, Conn.
Niagara Machine & Tool Works, Buffalo, N. Y.
Oilgear Co., Milwaukee, Wis.
V & O Press Co., Hudson, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES, Punch
Minster Machine Co., Minster, Ohio

PROFILING Machines
Gorton Machine Co., Geo., Racine, Wis.
Reed-Prentice Corp., Worcester, Mass.

PROTRACTORS
Bausch & Lomb Optical Co., Rochester, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Lufkin Rule Co., Saginaw, Mich.

PULLEYS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Johnson Mach. Co., Carlyle, Manchester, Conn.

PUMPS, Centrifugal
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ingersoll-Rand Co., New York, N. Y.

PUMPS, Hydraulic
Oilgear Co., Milwaukee, Wis.
Vickers, Inc., Detroit, Mich.
Watson-Stillman Co., New York, N. Y.

PUMPS, Lubricant
Brown & Sharpe Mfg. Co., Providence, R. I.
Narragansett Products Co., Providence, R. I.
Ruthman Machinery Co., Cincinnati, Ohio
Tomkins Johnson Co., Jackson, Mich.
Vickers, Inc., Detroit, Mich.

PUMPS, Oil
Brown & Sharpe Mfg. Co., Providence, R. I.
Narragansett Products Co., Providence, R. I.
Ruthman Machinery Co., Cincinnati, Ohio
Tomkins-Johnson Co., Jackson, Mich.
Vickers, Inc., Detroit, Mich.

PUMPS, Power
Clearing Machine Co., Clearing, Ill.
Oilgear Co., Milwaukee, Wis.
Watson-Stillman Co., New York, N. Y.

PUNCHES, Center and Hand
Lufkin Rule Co., Saginaw, Mich.

PUNCHES, Power
Buffalo Forge Company, Buffalo, N. Y.
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.
Mitts & Merrill, Saginaw, Mich.
Niagara Machine & Tool Works, Buffalo, N. Y.
Wiedemann Mach. Co., Phila., Pa.

PUNCHING and Shearing Machines
Buffalo Forge Company, Buffalo, N. Y.
Consolidated Mach. Tool Corp., Rochester, N. Y.
Kent-Owens Machine Co., Toledo, Ohio
Modern Tool Works, Rochester, N. Y.

PYROMETERS, Electric
Hoskins Mfg. Co., Detroit, Mich.

REAMERS, Adjustable
Butterfield Division, Union Twist Drill Co., Derby Line, Vt.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

REAMERS, Solid
Butterfield Division, Union Twist Drill Co., Derby Line, Vt.
Gisholt Machine Co., Madison, Wis.
Greenfield Tap & Die Corp., Greenfield, Mass.
Holman Reamer Co., Manchester, Conn.
Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.
Standard Tool Co., Cleveland, Ohio
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Union Twist Drill Co., Athol, Mass.

REAMING Machines
Van Norman Machine Tool Co., Springfield, Mass.

RECTIFIERS, Mercury Arc
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

RECTIFIERS, Power
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

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Simple, inexpensive punches and dies available for accurate holes in copper, aluminum, duralumin, etc.

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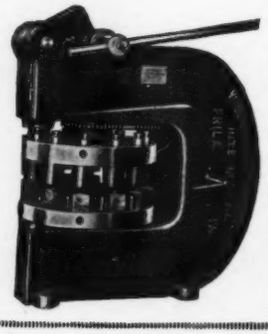

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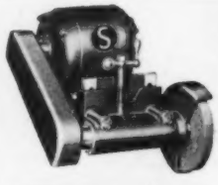

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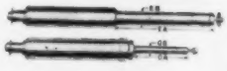

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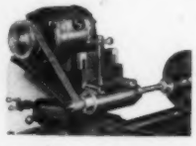

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Lincoln Electric Co., Cleveland, Ohio

ROLLS, Bending & Straightening
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.

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Lufkin Rule Co., Saginaw, Mich.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.

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Starrett Co., L. S., Athol, Mass.

RULES, Steel & Wood
Brown & Sharpe Mfg. Co., Providence, R. I.

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Oakite Products, Inc., New York, N. Y.

SAFETY Guards, Power Press
Junkin Safety Appliance Co., Louisville, Ky.

SAND Rammers, Pneumatic
Ingersoll-Rand Co., New York, N. Y.

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Continental Machines, Inc., Minneapolis, Minn.
Laidlaw, Inc., Wm., Belmont, N. Y.

SAWING Machines, Power Hack
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Avey Drilling Machine Co., Cincinnati, Ohio
Earle Gear & Mach. Co., Phila., Pa.
Peerless Machine Co., Racine, Wis.
Racine Tool & Machine Co., Racine, Wis.

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Ingersoll-Rand Co., New York, N. Y.

SAWS, Hack
Armstrong-Blum Mfg. Co., Chicago, Ill.
Starrett Co., L. S., Athol, Mass.

SAWS, Hack, Frames and Blades
Barnes Co., W. O., Detroit, Mich.
Delta Mfg. Co., Milwaukee, Wis.
Racine Tool & Machine Co., Racine, Wis.
Starrett Co., L. S., Athol, Mass.

SAWS, Metal Cutting
Avey Drilling Machine Co., Cincinnati, Ohio
Racine Tool & Machine Co., Racine, Wis.

SAWS, Milling
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

SAWS, Screw Slotting
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Union Twist Drill Co., Athol, Mass.

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SCREW Drivers & Nut Setters, Pneumatic
Ingersoll-Rand Co., New York, N. Y.

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Aluminum Company of America, Pittsburgh, Pa.

SCREW Machine Tools and Attachments
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Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.

SCREW Machine Work
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Morris Machine Tool Co., Cincinnati, Ohio
National Mach. Tool Co., Cincinnati, Ohio
New Britain-Gridley Machine Co., New Britain, Conn.
Taft-Peirce Mfg. Co., Woonsocket, R. I.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Warner & Swasey Co., Cleveland, Ohio

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Cleveland Automatic Machine Co., Cleveland, Ohio.
Cone Automatic Machine Co., Windsor, Vt.
Foster Machine Co., Elkhart, Ind.
Greenlee Bros. & Co., Rockford, Ill.
National Acme Co., Cleveland, Ohio
New Britain-Gridley Machine Co., New Britain, Conn.
Warner & Swasey Co., Cleveland, Ohio

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Foster Machine Co., Elkhart, Ind.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mach. Co., Springfield, Vt.

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Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW Threading Machines
Brown & Sharpe Mfg. Co., Providence, R. I.

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Danly Mach. Spec. Co., Inc., Chicago, Ill.
Eastern Mach. Screw Corp., New Haven, Conn.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SCREWS, Machine
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Eastern Mach. Screw Corp., New Haven, Conn.

SCREWS, Recessed Head
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Chandler Products Co., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., Cleveland, Ohio
National Screw & Mfg. Co., Cleveland, Ohio
Parker-Kalon Corp., New York, N. Y.
Pheoll Mfg. Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS, Safety
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS, Shoulder
Allen Mfg. Co., Hartford, Conn.

SEPARATORS, Oil & Waste
De Laval Separator Co., New York, N. Y.

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Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Hendey Machine Co., Torrington, Conn.
Ohio Machine Tool Co., Kenton, Ohio
Pratt & Whitney Division Niles-Bement-Pond Co., Hartford, Conn.
Smith & Mills Co., Cincinnati, Ohio

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American Steel & Wire Co., Chicago, Ill.
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Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), New York, N. Y.
U. S. Steel Corp., Pittsburgh, Pa.

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Norton Co., Worcester, Mass.

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Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.
Consolidated Mach. Tool Corp., Rochester, N. Y.
Mitts & Merrill, Saginaw, Mich.
Modern Tool Works, Rochester, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.

SHEAVES, V Belt
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.

SHEET Metal Working Mchy.
Cincinnati Shaper Co., Cincinnati, Ohio
Cleveland Punch & Shear Works, Inc., Cleveland, Ohio.
Niagara Machine & Tool Works, Buffalo, N. Y.

SHIELDS, Welding
Lincoln Electric Co., Cleveland, Ohio

SLOTTING Machines
Consolidated Machine Tool Corp., Rochester, N. Y.
Modern Tool Works, Rochester, N. Y.

SOCKETS
Standard Tool Co., Cleveland, Ohio
Union Twist Drill Co., Athol, Mass.

SOCKETS, Detachable Head
Armstrong Bros. Tool Co., Chicago, Ill.

SOCKETS, Wire Rope
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SOLENOIDS
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Ex-Cell-O Corp., Detroit, Mich.

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Farrel-Birmingham Co., Inc., Buffalo, N. Y.
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Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

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SPINDLES, Grinding
Ex-Cell-O Corp., Detroit, Mich.

SPOT Welder Control
General Electric Co., Schenectady, N. Y.

SPROCKETS
Bilgram Gear & Mach. Works, Phila., Pa.
Boston Gear Works, Inc., North Quincy, Mass.
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Grant Gear Works, Boston, Mass.
James Co., D. O., Chicago, Ill.
National-Erie Corp., Erie, Pa.
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Brown & Sharpe Mfg. Co., Providence, R. I.
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Lincoln Electric Co., Cleveland, Ohio

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Carpenter Steel Co., Reading, Pa.
Latrobe Elec. Steel Co., Latrobe, Pa.
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Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL, Alloy Cold Drawn
Union Drawn Steel Co., Massillon, Ohio

STEEL, Cold Finished
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Wyckoff Drawn Steel Co., Pittsburgh, Pa.

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Latrobe Elec. Steel Co., Latrobe, Pa.
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Williams and Co., J. H., Buffalo, N. Y.

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Allegheny-Ludlum Steel Co., Brackenridge, Pa.
Carpenter Steel Co., Reading, Pa.
Crucible Steel Co., New York, N. Y.
Ingersoll Steel & Disc Div. of Borg Warner Corp., Newcastle, Ind.

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Union Drawn Steel Co., Massillon, Ohio
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL, Tool
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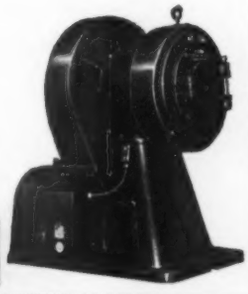

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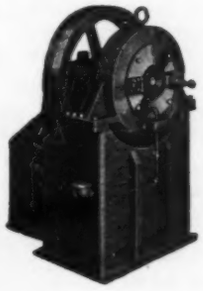

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Standard Tool Co., Cleveland, Ohio

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Starrett Co., L. S., Athol, Mass.

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Cincinnati Bickford Tool Co., Cincinnati, Ohio
Ettco Tool Co., Brooklyn, N. Y.
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Haskins Co., R. G., Chicago, Ill.
Moline Tool Co., Moline, Ill.
Murchey Machine & Tool Co., Detroit, Mich.
National Automatic Tool Co., Richmond, Ind.

TAPPING Machines, Multiple Spindle
Baker Brothers, Inc., Toledo, Ohio.

TAPPING Machines, Nut
Acme Machinery Co., Cleveland, Ohio

TAPPING Machines, Pipe Coupling
Acme Machinery Co., Cleveland, Ohio

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Geometric Tool Co., New Haven, Conn.
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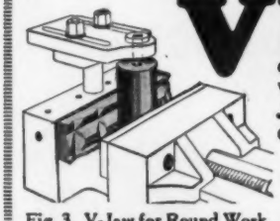

Fig. 3. V-Jaw for Round Work

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Fig. 2 Without Jig Attachments

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